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ABSTRACT

The purpose of this study was to identify the content and form of the conversations and recognize the variables that are acting during visits to animal exhibits, and the influence on conversational content of both different types of locations and animal exhibits and visit rationales. Conversations of children between the ages of 3 and 12 years and their accompanying adults were recorded at animal exhibits during visits, which were organized either by the school or by their families, to a variety of zoos and museums in the United States and United Kingdom. Findings indicate that despite the differences in setting, there was a surprising uniformity in the responses in the different institutions and between U.S. and U.K. visitors to zoos. There were some statistically significant differences between some categories of the conversations at the three types of animal exhibits, between these and those at farm animals, between school and family groups, between the different sub groups with the school parties, and between pupils of different age groups. It is concluded that there is little evidence that schools are developing children's understanding of zoology during such visits or that the visitors are using the interpretation provided by the museum or zoo. Contains 26 references. (Author/JRH)

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TALKING ABOUT ANIMALS: STUDIES OF YOUNG CHILDREN VISITING ZOOS, A MUSEUM AND A FARM

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King's College
University of London

Thesis submitted for the degree of Ph.D.
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Talking about animals: Studies of young children visiting zoos, a museum and a farm

Susan Dale Tunnicliffe

Abstract

Conversations of children, between the ages of three and twelve years, and their accompanying adults were recorded at animal exhibits during visits, organised either by the school or family, to a variety of zoos in England and the USA, and to the Natural History Museum, London. The animal exhibits were either alive, preserved or models, sometimes animated. Conversations of school groups at a farm in England were also collected.

A total of 2, 966 conversational exchanges at animal exhibits, and 248 at the farm, were tape recorded, transcribed and coded according to a systemic network that had been designed after examining the data collected from pilot studies. A range of variables was created from the coded data.

Despite the differences in setting there was a, to some extent surprising, uniformity in the responses in the different institutions, and between US and UK visitors to zoos. There were some statistically significant differences between some categories of the conversations at the three types of animal exhibit; between these and those at farm animals; between school and family groups; between the different sub groups with the school parties - teacher groups, chaperone groups and children alone; between the two pupil age groups: pupils of seven years and below and eight to twelveyears.

There is little evidence that schools are developing children's understanding of zoology during such visits or that the visitors are using the interpretation provided by the museum or zoo: comments about the exhibits are drawn from their own knowledge.

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I am indebted to my brother and his family for allowing me to tape their conversations during our visit to London Zoo and to use the transcript as the Prologue of the thesis.

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Susan Dale Tunnicliffe
Bracknell
Berkshire
October 1995

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MICHAEL'S VISIT TO LONDON ZOO

AUGUST BANK HOLIDAY SUNDAY 1992

Michael, aged 7 years and 10 months, his mother, Jane, and brother Neil (aged 2 years and 4 months), visited the London Zoo in a family group that included grandmother, his step great-aunt, the author of this thesis, and his step-grandfather, called 'Uncle'. The dialogue that took place at each animal exhibit visited is reproduced below. Conversations within the group that took place between exhibits were not recorded. The transcript is a complete record of the conversations of the group at the animal exhibits from the first to the last animal viewed when Michael and his aunt were together. The full transcript is provided to give the reader a feel for the nature of the data investigated by this research. The commentary interprets the visit using theoretical positions arising from linguistics and the literature on learning from informal sources.

TRANSCRIPT OF MICHAEL'S VISIT TO LONDON ZOO

1. Gorilla

Michael: There's a monkey, monkey, where's all the other ones?

Grandma: I expect they are round the corner having their breakfast. Look he's poking his nose like our Neil!

2. Cranes

Michael: Look at that Grandma ! Look at that!

Grandma: That's a crane! That's a Red Crowned Crane (label says).

Michael: Look at that one it's nearly bare! (It was a young one in young plumage).

3. Rhino

Grandma: They've got something to poke your nose with. Look!

Neil: What are they?

Grandma: Rhinoceroses.

4. Lar Gibbons

Michael: There are some monkeys.

Grandma: Oh look! There's one in there! Tell it to do it again. Look! It's standing on its head.

Mum: It's got a stick. Look! What's it going to do with that stick?

5. Batuleur Eagles

Michael: There's some birds.

6. Tigers

Michael: Look Neil! There's one, there's one!

Neil: There's one, there's one! Look up there! Look! Tiger!

7. Lions

Michael: Hey Neil, what's over there? Look! There's some lions.

Michael: There's another one! Grrr! He's not got a very big mane!

Aunt: No, they are Asian Lions. They're ever so rare. You'll not see one anywhere else. They have very little mane.

Michael: He just blinked at Neil.

Neil : Look at there!

8. Tiger

Neil: The baby said 'Tiger'!

Mum: Yes! She did!

Uncle: 'Tiger, tiger, burning bright!'

9. Black Footed Penguins

Grandma: Here's the Penguins! Feeding time 2.30. Don't they smell?

Mum: That one's under the water. Penguins always seem very small these days; when I was young they were much bigger.

Michael: I wish I were a bird....the penguin splashed water over there. Hey! Look at that! Can one (a penguin) go in a wheel chair?

Aunt: People do.

Michael: What! Can penguins too?

Aunt: I suppose so!

10. Toucan

Michael: Look at that one!

Grandma: Look at these, it's feeding it. Look! It's bringing something out of its mouth and giving it to them. He's just regurgitated berries and given it to them.

Michael: There he is!

Grandma: Where would he get his berries from? Oh look! He is sharpening his beak. Aren't they funny looking?

Neil: Hello! Hello!

Grandma: A good polishing stick! He was fetching berries up, Jane!

Neil: Hello! Hello!

11. Bird

Neil: There he is! Oh! Yes!

Grandma: They've got the heat lamps on!

Mum: It's tropical.

Michael: It's sad!

Mum: Why is it sad?

Michael: He's got no other birds.

Grandma: It's eating its breakfast. Do you think it's saying 'Hello!' Neil?

Neil: Yes.

Grandma: A big umbrella plant!

Michael: Why is that there?

12. Woodpecker

Grandma: Get your feet off please, you're not meant to be on there.

Michael: Look! It's on the picture. There's that one. Look at that one Grandma ! Yes. I've seen it and look at this white one!

Michael: Giant Woodpecker!

Grandma: Yes, can you see where it has got the wood off the tree.

Michael: Mum! It's a woodpecker

Mum: Is it?

Michael: Yes! Look!

Mum: Why do woodpeckers peck at the wood?

Uncle: To get the grubs

Michael: Where is its home?

Grandma: There's his home.

Michael: Oh! It's up there!

Neil: I want...

13. Bird

Michael: I wonder what this one is? I can't find it. Oh yes!

Grandma: They are both sat as still as anything up there!

14. Mynah Bird

Uncle: A mynah bird!

Grandma: A mynah bird. I wonder if it will speak to me?

15. Saffron Toucan
Michael: Yes! It's there. There it is, up there!

16. Bird
Neil: Big worm! A big worm, there!
Aunt: Oh!
Michael: I wonder where it is? What is that over there Neil? What's that over there?
Neil: Something moved.
Aunt: Right high up.
Neil: Yes! There it is!

17. Nile Crocodile
Michael: He's got his mouth open, he is quite...Neil's gone!

18. Lizard
Michael: Have they got some snakes?
Mum: What is it here?
Michael: Lizard, have they got some snakes? It's camouflaged...

19. Python
Aunt: Can you see it?
Michael: Oh yes! It's under the water.

20. Skinks
Michael: Where is it? There it is! Can you see it?

21. Three Toed Box Tortoise
Michael: Oh look, its pool's gone.

22. Skinks
Michael: Oh! Look at these....There is one there and one there and one there. They're a sort of lizard. They catch flies, they catch....
Aunt : Lord Derby's Zonure (to herself reading label).
Michael: They could do with some flies in there.

23. Tortoise
Michael: Where is this one? Oh yes! They are over there. They are well camouflaged.

24. Snake
Michael: It's on that ledge.
Aunt: What is it?
Michael: It's a snake of some sort...... It's brilliant, London Zoo! It's better than Chester. I have been to Chester Zoo when I was in class 1. I was only 5 years old.

25 Chinese Alligators
Michael: They look like plastic.
Aunt: Yes, they do, don't they?

26. Bearded Dragons and Skinks
Michael: Look, they look as if they are in a tub (reading label about smuggling).

Aunt: That's a blue tongued skink.
Michael: That's a blue one.
Aunt: They have got a blue tongue, look!

27. Viper
Michael: Oh look! Yes! That's a viper, they live in pots (the viper was lying by the side of a cooking pot). They come out of pots, you know, when they play the music and go 'der di der di deer'!
Aunt: Yes.
Michael: We're down here! (to other family members).

28. Milk Snake
Michael: That one's dangerous because it's red.

29. Cobra
Michael: That's a cobra.
Neil: Yes, it's a cobra.
Michael: No, it's not a cobra.
Aunt: Why not?
Michael: Because it hasn't got things on it (showing model cobra's flanges).
Aunt: The things at the side of the neck.
Michael: Some cobras don't have these things on.

30. Snake
Aunt: Can you see this one?
Michael: Yes, he is, at the back there, on the rocks! There are two, there is another one somewhere but I can't see it.
Aunt: Where?
Michael: You can just see its head.

31. Indian Cobra
Aunt: It says this is one of the world's most deadliest snakes.
Grandma: The Indian cobra. The Indian cobra, it's there!

32. Pandas
Mum: Look at these monkeys!
Aunt: Come here, Michael, through here.
Michael: That shouldn't be in there because it's panting...is there another one?
Grandma: The sun's coming out.

33. Chimpanzees
Michael: Monkeys!
Aunt: No! They are chimpanzees. They haven't got tails. They are our nearest relatives.
Grandma: Isn't it funny? I love to watch them; I could watch them for ages.
Michael: It's hanging under its tummy.
Grandma: Is that a mummy or a daddy? I think it's a mummy!
Michael: Ah! Ah! Ah! Ah! Where is he going? Where is the one with the baby? Isn't it funny ? Their hands and feet are just like our hands, look!

34. Gorilla

Michael: Look! There is one up there. Is it the same one we saw earlier sitting up there outside?

Grandma: It's likely, it looks like the same one. It can choose where it goes.

35. Pike

Michael: Look at that, Grandma !

Grandma: What is it?

Michael: I don't know.

Grandma: What does it look like?

Michael: A fish.

Aunt: It's a pike! There's the eel! Look! Michael! The eel's half buried at the bottom!

36. Cat fish

Uncle: See these in there? They are cat fish, can't you hear them meowing?

Michael I don't like these fish.

Aunt: Aren't sharks fish?

Michael: No! They are more like different fish. These sort of fish are not interesting.

37. Sharks

Michael: Yes, these are sharks, look!

Aunt: How can you tell?

Michael: Because they are dead long and have tails like that. That's not a shark though (bat fish). I expect that's its food.

Aunt: Why is that not a shark?

Michael: That's their food probably.

Aunt: But how do you know it's not a shark?

Michael: Because it's flat.

Aunt: Where's the shark's mouth?

Michael: Where's the shark's mouth? It's under there. I wonder what sort of shark this is?

Aunt: It's called a bat fish.

Michael: It must be a kind of shark.

Aunt: No it isn't, I think they just live together.

Michael: Look there's the shark's mouth under there. Perhaps they just live together and are good friends, this is where they live. Why aren't they big?

Aunt: Well, you'd need a big tank for very big sharks.

Michael: They look, they look on that side but they are massive. That's the big one, that's massive. That one's got colours.

Aunt: I expect that one's a different sort of shark.

Michael: That one's the big one.

38. Piranhas

Michael: Are these piranhas?

Aunt: Yes, if you look carefully you might see their teeth.

Michael: Where are all the fish that they eat?

Michael: Can they see us?

Aunt: No, we're in the dark, that's probably why it's dark in here.

39. Shrimp

Michael: What's that?
Aunt: Which one?
Michael: That thing on the rock.
Aunt: It's a shrimp.
Michael What's that?

40. Echinoderm/Sea anemone/Coral

Michael: Shrimps?
Aunt: No, they are relatives of a starfish. It's a sort of sea urchin. Can you see the coral?
Michael: Where?
Aunt: There!
Michael: I can see their eyes.
Aunt: No, they are tentacles.
Michael: Look at those with something in the middle (sea anemones).

41. Turtle

Michael: Where's its shell? At the bottom?
Aunt: They only have a shell on the top. It's not a real shell. It's very thick scales like your snake. Your snake has got scales.

42. Lobster

Michael: Hello! It just waved!

43. Sea Anemones

Aunt: What about the red things on the rocks.
Michael: What are they?
Aunt: Sea anemones, can you see the mouth? There, in the middle of the tentacles.
Michael: What do they eat then, fish?
Aunt: No, they eat small bits in the water. Have you heard of jellyfish?
Michael: Yes, so when the sea anemone turns over it's a jellyfish?

44. Sea Horse

Michael: What's this big long thing?
Mum: They look like logs, they don't all look like that (ordinary fish).

45. Plaice

Mum: Look Michael! Plaice!
Michael: Where?
Mum: Look! There!
Michael: You can see it breathing. He is breathing, isn't he?

46. Starfish

Michael: What's in there?
Mum: You've missed one at the back there.
Look at the starfish Neil! There's one over there.
Michael: That's where they live.
Mum: How do you think they stick to the rocks?
Michael: They've got stuff under the bottom.

Mum: Sucker pads, you can see them?
Aunt: Can you see them Michael? They've got tube feet
Mum: Yes Michael, can you see them? You could do with one stuck to the glass.

47. Okapi
Michael: Look! That's half giraffe and half zebra!

48. Ants
Michael: Where is it? Oh yes! There they are, over there, little baby spiders.
Aunt: What are they, Michael?
Michael: Spiders.
Aunt: No they're not!
Michael: Ants.
Grandma: Oh yes! They're on the grapefruit.

49. Jellyfish
Michael: What are jellyfish doing here?
Aunt: Look! They are just like you said. (referring to conversation 43)
Michael: Yes!

50. Hermit Crab
Michael: There's a rare spider over here. Look! It's a crab spider.
Mum: It's up there, in the shell.

51. Crickets
Grandma: They are crickets.
Michael: What, them?
Grandm: They rub their back legs together and make a noise!

52. Millipede
Grandma : They are millipedes there!
Michael: Ugh!

53. Stick insects
Grandma: Now, what are they? Does it say here? Stick insects.
Michael : Stick insects? What are they? Where are they? Oh they are, up there!
Grandma: I can't see any. Where are they?
Aunt: They are up there, the brown things.
Grandma: Aren't they funny?

54. Tarantula

Michael: What's this one, Aunt Susan? Hey! There is a spider! Hey Grandma ! Look at that!
Grandm : Ergh!
Michael: How did London Zoo manage to catch that?

55. Spider

Neil: Spider! Spider!
Michael: I can see him now looks like... How does that one move? Why isn't he coming out? That one's out, there's that one, a great big one.
Aunt: Is that another tarantula?

56. Bird Eating Spider

Michael: I wonder what's in there?
Mum: It's a huge big spider.
Aunt: It's a bird eating spider the label says.

57. Cockroaches

Michael: What are they?
Aunt: They are cockroaches.
Michael: What do they do?
Aunt: They eat bits of food around.
Michael: It's a kitchen, a dirty kitchen!

58. Locusts

Michael: What are these?
Aunt: These are locusts. They come and land on the trees and eat the leaves.
Michael: They are bare.
Aunt: That's right, they have eaten all the leaves!
Michael: Erg! They look like grasshoppers!

59. Dung Beetle

Michael: What's that? It looks like elephant pooh!
Aunt: That's right, and there are beetles which live in it.
Michael: Erg!

60. Golden Lion Tamarins

Michael: That's a Golden Lion Tamarin.
Grandma: How did you know?
Michael: Because they look like in that book Granny Dale gave me.
Aunt: They are New World Monkeys. Look at their noses!
Michael : It's doing a wee!

61. Chipmunk

Grandm : Aren't they tiny?
Michael: Those two are the rescue rangers. (TV characters in a cartoon)
Grandma: Aren't they tiny?
Michael: Do chipmunks like snakes ? (He had been carrying a toy snake around the zoo and was told to put his snake away with the monkeys, etc.)

62. Mongoose

Grandma: It sometimes shivers in his sleep. It says.... Oh! Now he's gone under there.
Michael: That's the stretch bit! Is that his stretch bit?
Grandma Oh! He's going to do a wee. He's having a scratch! Oh! He's going to make a new bed!
Michael: Perhaps it's the toilet. He's got lots of beds already in there in here, in there. Where's 15 gone in there? Hello 15! Ner-ner, ner-ner! ('15' is a TV cartoon character)

63. Zorilla

Grandma: There's one on the top of this thing here, this stone.
Michael: What is it?
Grandma: A skunk?

64. Mice

Grandma: Look how quick they go round and round and round.
Michael: Look! They go in their dish!

65. Leadbetter's Possum

Grandma: Where is it?
Michael: It is down there on the floor. Look that brown thing! (He had already found it with his Uncle.)

66. Echidna

Michael: Is there glass there?
Aunt : Yes.
Michael: Oh! What is it? A porcupine?
Aunt: No. It's an egg laying mammal, an echidna.
Uncle: Oh! There's the porcs, Michael!
Grandma: No it isn't, it's an echidna.

67. Bats

Aunt: Look! They are upside down on the tree.
Michael: Where are they? Are they flying round?
Aunt: Yes.
Michael: Oh yes! There's some. There's some over there.
Aunt: Yes.
Grandma: Are these bats?
Aunt: Yes, they were flying around in Sri Lanka.
Grandma: We get bats in our garden.
Michael: Can we go on now?

68. Genet

Michael: What's this?
Aunt: What does it look like?
Michael: A cat!
Aunt: Yes! It's called a splotched genet.
Grandma: What is it?
Michael: It's a cat and it goes a walk around there and through there.
Grandma : Is that an egg it's got there in the picture? Does it eat them?
Michael: Yes.

69. Bats

Michael: They are bats, Neil! They are bats! When are we going to get something to eat Mum?

70. Seals

Aunt: Seals have not any ear flaps at all, Michael..not like you. (tugging his ears)

Michael: Why? Look he's got brown round his middle. Look! He's gone to get changed, probably lost his swimming trunks, probably lost his invisible swimming trunks. There's a bit of brown bit under there, those must be his swimming trunks.

What can this transcript tell us about the experience of these visitors whilst viewing the live animal exhibits?

> 'Museum visitors must somehow perceive information before they can store it in memory. Under normal conditions, people pay attention to things that interest them. Their interests are determined by experiences, knowledge, and feelings. This is a classic feedback loop: People learn best those things that they already know about and interest them, and people are interested in those things they learn best.'
>
> (Falk and Dierking 1992:100)

But in what topics are visitors interested when they look at animals as exhibits? If Falk and Dierking are correct in their statement, the content of the conversations of both primary school and family groups should provide information about what is of interest to the individuals in these parties. Hence, such information would enable both teachers and museum and zoo educators to plan their work accordingly, so that the interaction between institution and visitor starts with the areas of interest revealed by the spontaneous disclosure of the visitors and develops these ideas further into scientific understanding.

The Michael transcript, of conversations of a family at live animals in London Zoo, illustrates the content and form of conversations that form the basis for this study which focused upon the content of the conversations at animal exhibits of a particular age group, children up to the age of twelve, at the end of primary education, and their accompanying adults. (Middle schools, whose pupils leave at twelve for secondary education, are deemed primary).

This present study is concerned mainly with comparing the content of conversations about animal exhibits within two locations, a zoo and a natural history museum, both of which are referred to as museums by Falk and Dierking (1992). However, in this thesis the term 'museum' will be used to refer to the Natural History Museum, London and similar places and zoos will be referred to as such.

Zoos and museums have traditionally provided exhibits for visitors to view, but Hein (1995) points out that there are two sides to exhibits, that of the visitor and that of the provider.

> 'Museums as teaching institutions (or more accurately exhibits and programmes with educational objectives which intend to teach their visitors/participants something) need to decide what they want to impart and how they plan to do it. This is hardly revolutionary. The problem in all this is the often implicit assumption that this task of deciding on educational goals requires a focus on the topic or subject. How shall we arrange the artists to get across our message? How shall we guide the visitor through the museum so he or she will understand what we want to impart? What label will be most understandable? (That is, from which label will the visitor best get the knowledge we wish to supply?)
>
> I argue that the most evaluation work has been based on the premise that we need to modify our exhibits so as to maximise what visitors learn *of the content we want to teach.* This also assumes a close causal relationship between a particular way of installing an exhibit or devising a programme and the quantity and quality of learning for a majority of visitors. 'I tried this label and no one read it. I put up a different one and seven out of ten visitors stopped and could tell me what it said.' Therefore the second label accomplishes what I want.
>
> But there is another whole world of learning that goes on in museums, the learning that is constructed by the visitor out of the experience and is not necessarily correlated closely with our teaching efforts.'
>
> (Hein 1995)

Falk and Dierking (1992:2) consider that the museum or zoo experience for the visitor can be conceptualised as :

> 'involving an interaction among three contexts:
> 1) The personal;
> 2) The social; and
> 3) The physical.
> All museum visits involve these three contexts; they are the windows through which we can view the visitor's perspective.'

1 The personal context within which the conversations were generated

Falk and Dierking (1992: 2) consider that the personal context of each visitor, the interests and previous relevant experiences that they each bring, is unique and will affect the way in which they interpret what they see. However, the site where the animal exhibits are seen, the rationale for the visit and the social context in which it is made may provide some pattern to the content of the comments about animal exhibits that visitors generate.

Individuals within Michael's family group, the transcript of whose conversations is reproduced in the Prologue, talked about what they already knew and felt about the animals and their expectations for the visit. The personal knowledge of visitors was reflected in the attributes that they choose to comment upon, which were particularly the names or identification of the specimens, their body parts and behaviours. Does this understanding of visitors reflect that of 'everyday' science, school science or zoological science? In segment 5 Michael recognised specimens as 'birds' allocating them to a scientific category, yet in segment 36 Michael denied that a shark is a fish, regarding the two categories as mutually exclusive. On occasion the group work out the identity or category of an animal from their own knowledge, for example Michael did this in segment 35, but at the prompting of his grandmother, who obviously held expectations that Michael should think for himself and learn something.

Visitors often refer to human form and behaviour when they interpret the animals. This phenomenon is referred to as anthropomorphism. The low incidence of this phenomenon within the Prologue is surprising. In segment 1 Grandma suggested that the animals were 'having their breakfast'. Visitors also express concern for certain aspects of the animals' behaviour which they interpret in human terms and express concern for the welfare of the animal. For example, in segment 32, Michael referred to the panda's behaviour and related this to its living conditions, suggesting that these were not as they ought to be.

Animals triggered different kinds of episodic memory, for example in segment 29 Michael announced that a snake 'is dangerous, because it is red'. In segment 9 Michael's mother recollected the size of penguins of her childhood, whilst in segment 69 the Grandma recalled the presence of bats in the garden and the aunt remembered specimens seen living free in Sri Lanka. Furthermore, at intervals, the aunt provided more specialist knowledge to her group, as in segments 7, 35 and 43, for example.

The personal knowledge of the visitors is used to interpret the exhibits and is expanded by fresh observations. The group members used their personal knowledge to categorise and label the animals, albeit frequently incorrectly, as in the porcupine/echidna dialogue in segment 66. Furthermore, there is evidence that some new ideas were developed during the visit, extending the personal context of an individual, for example in segments 40, 43 and 49, through which Michael, prompted by his aunt, worked out a relationship between sea anemones and jellyfish, one of the few examples of ideational thought (Halliday 1973: 1980) found within the data.

2 Physical context within and about which the conversations were focused

The physical context within which animal exhibits are viewed is likely to influence the content of conversations. Michael's family held expectations about what the zoo location had to offer them, about what they would see. Michael anticipated seeing a live snake because he was visiting a zoo and during his visit he contrasted London Zoo with another zoo (segment 24). The actual settings in which the animals were viewed was the focus of some exchanges, e.g. 38, 57, and the other aspects of the exhibit, beside the animals, as in segments 9 and 66. Other items on display with the animals were referred to and acted as locators, e.g. segment 65. Labels are used to match the actual specimen with picture, e.g. segment 12; find out either the names of unknown animals, e.g. segment 31, or additional information, e.g. segment 25. The actual physical state of the animal - alive, dead or simulated - is part of the physical context and Michael commented on this in segment 25, 'Looks like plastic'.

3 The social context within which the exchanges were generated

The social context of the visit that produced the conversation is expected to affect the conversational content. School children and their accompanying adults are expected to have conversations the content of which is more focused on particular attributes of the specimens whereas family conversations would be expected to have more social comments and be less concerned with a range of attributes and have few apparent educational tasks.

The Michael transcript was that of conversations of an extended family on a special leisure day out. There were four adults and two children, an adult:child ratio of 2:1 if the group kept together. There are macro social and cultural aspects to any visit to animal specimens as well as particular ones related to the composition of a specific group. The role that constituent group members assume, as well as the rationale of the group members for undertaking the visit, are important factors that may influence the nature and content of the conversations which are the tool used in this thesis to explore the responses of visitors to the animals and the exhibits.

4 The purpose of this study

The purpose of the study reported in this thesis is to identify the content, and form, of the conversations and recognise the variables that are acting during visits to animal exhibits and to identify their influence on conversational content of both different types of locations and animal exhibits and visit rationales. Moreover, I wanted to know whether groups of visitors that contained primary aged children noticed and commented upon attributes of animals that zoologists consider important. I wanted to discover if the visitors talked about the exhibits and received the message of the exhibit and used this in the conversations whilst viewing the exhibit, or whether the visitors interpreted the animals for themselves and constructed their own narrative. Furthermore, I wanted to know if the exhibit animals engendered a more focused conversation in terms of content than if the animals were not exhibits.

The Michael transcript, used as an example of the conversational segments collected for this study, shows that the three contexts, physical, personal and social, described by Falk and Dierking (1992), are relevant in analysing a visit to a zoo. Furthermore, the transcript shows that the work to be reported in this thesis is at the juxtaposition between science education and visitor studies. The content is zoological but the response of visitors to exhibits is within the field of visitor studies. However, much of the visitor studies research has been conducted in the USA. Therefore it was important to find whether conversations generated by families and school groups in zoos in the USA were similar in content to those heard in England, so that the research findings from each country could be validly applied to contexts from the other country.

The spontaneous conversations cannot reveal the learning that has occurred at the exhibit but provide a record of what is *actually happening* at that point in time. The work reported in this thesis is within the genre of existing work in the field of visitor studies which is often based on fragments of visits. Incomplete as it is, the record of the visit of Michael and his family is unusually complete within the literature of studies in informal settings because it contains all the comments made by a particular group at all the exhibits seen during one visit.

The conversations which are analysed in this study are a record of:

- the perspective of the visitors, adults and children, family or school members looking at animal specimens, and provide us with a glimpse of the cultural and social influences that operate during such a visit;
- memories and narratives constructed by visitors and the information that is exchanged by them as they interpret the exhibits;
- the language that the visitors use at the exhibits and the extent, if any, that the language of the institution is incorporated by the visitors into their personal dialogues;
- the content of utterances of visitors within a conversational segment.

This study:

- explores how groups of children structure their observations and discussions in a visit to an animal exhibit. Whilst the content of the conversations may be disappointing to zoologists, they provide an indication of what is occurring at the exhibits and a starting point for developing further understanding of and for families and primary school visitors to animal exhibits - Chapters 4 to 8;
- raises a number of questions about the ways in which visitors categorise animals and the means that they employ to do so. Furthermore, it raises the issue of whether there is a match between the names and categories used by the institution and that of the visitor - Chapter 4;
- explores the extent to which visitors draw upon the intellectual context supplied by the institution via labels and comments on the general

ethos of the design and display of exhibits, the choice of specimens to observe and considers whether the way in which the exhibits are grouped generates different proportions of comments - Chapters 4, 5 and 6;

- identifies the form of dialogue used by different people at exhibits and the influence of the varying social composition of the groups, or age of the children, on the content of the conversations - Chapter 7 and 8.

Some, but not all, of the phenomena have been subject to research in other visitor studies. Therefore, Chapters 1 and 2 provide an overview of previous relevant studies and summarise the literature concerning zoos, museums and science centres with particular reference to the Natural History Museum London and the London Zoo. Chapter 1 reviews the knowledge about, and attitudes towards, animals and the way in which objects, with particular reference to animals, are named and categorised. Chapter 1 also presents the key aspects of visitor studies that are related to science museums and zoological exhibitions and gaps in our knowledge, that a detailed study of groups, such as Michael's, may go some way to filling, are identified. Chapter 2 considers animals as exhibits in terms of general exhibit theory.

Chapter 3 explores the analysis of conversations as a tool to help understand the interaction between the visitors at exhibits and between the visitors *and* exhibit designers, a 'conversation' mediated by the exhibit. It subsequently discusses the broad methodology used in the studies, identifying the strengths and limitations associated with naturalistic studies of this kind. A categorisation system to handle the qualitative data for such transcripts yield is developed, based on the systemic networks of Bliss, Monk and Ogborn (1983).

In Chapters 4, 5, 6, 7, and 8 the data are analysed theme by theme, according to the issues summarised in the analysis of the background to the study. In each case the data are presented, analysed and interpreted in the light of the relevant literature. Chapter 9 provides a summary and overview and the results of each of the separate analyses are synthesised, with several important aspects considered across all the sites.

Finally Chapter 10 considers the findings of the study and the implications for learning theory, for visitor studies research and for schools are discussed. Appendices contain summary tables of the data collected from each site, including some superordinate categories shown to be important in the individual analyses reported in the study; and demographic data of the schools studied; the historical perspective of the sites; the USA/English data and copies of published or presented papers which have used data collected during the study are included.

CHAPTER 1

EDUCATION OUT OF SCHOOL, VISITORS' BEHAVIOUR AND THEIR KNOWLEDGE OF ANIMALS

In this chapter I review four main areas to explore a framework for interpretation of the subsequent analysis and discussion of the conversations that are the focus of this research. These areas are:

- the characteristics of learning out of the classroom for both school children and leisure groups;
- generalised theories of learning, with particular reference to learning about animals;
- an overview of zoological taxonomy and what is known about visitors' knowledge of animals and their attitudes and expectations about animal specimens;
- pertinent knowledge established from general visitor studies to provide an understanding of visits to animal exhibits.

1.1 THE EXPECTATIONS OF VISITORS

Visitors to animal collections have implied expectations of what they will see. Zoo visitors anticipate seeing live animals, whereas, in contrast, visitors to a natural history museum expect to see preserved animals or models.

1. 1.1 The expectations of adults who bring children

The existence of natural history museums and zoos, as places that can be visited by anyone with the price of admission, creates expectations amongst the visiting public. Moreover, similar expectations about the nature of the visit, appropriate visitor behaviour and interests of the visitors are also held by the institutions that provide the facilities (Hood 1983). However, what are considered appropriate experiences in one site may not necessarily be the aces in another. For example, behaviour in a zoo may be different from that considered proper for a museum, both because of the preference of individual visitors for different settings (Whittall 1992) and because the constituents and socio-economic membership of groups visiting zoos differ from that of museums. Zoo visitors have a greater social orientation for their visits than do those to museums, who express more concern with learning (Hood 1983; Bitgood and Thompson 1987; Linton and Young 1992). Families and school groups both have different overt reasons for embarking on their visits, just as members of adult groups on leisure visits have specific goals and expectations (McManus 1987; Rosenfeld 1980: 34; Tunnicliffe 1994a).

Ever since zoos were established for the visiting public they have been the focus of leisure visits of families. Most visitors have been before (Hill 1971; Birney and Heinrich 1990), visit in a group, and regard the occasion as one of unique merit for social benefits involving family or friends (Cheek 1971; Kellert and Berry 1980: 50; McManus 1987; Diamond 1986). Family visitors feel that the zoo is a less highbrow place to visit than an art gallery, cultural museum or science centre and that it is a more appropriate place than a museum for a family visit (Wolf and Tymitz 1979; Bitgood and Thompson 1987; Linton and Young 1992; Milan and Wourms 1992). Family visitors to zoos cite learning as important (Birney 1986; Rosenfeld 1980: 37; Andersen 1993; Hill 1971; Birney and Heinrich 1990) but over two thirds of visitors to San Francisco Zoo had a context independent rationale, 'relaxation', 'people watching' and 'bringing the kids', rather than one that was content dependent, such as seeing the animals (Rosenfeld 1980: 35-40). However, seeing 'real' animals was the overall important learning objective (Rosenfeld 1980: 39).

preparing the children for the experience.Teachers organise visits for children to live animal collections for a variety of reasons, but the predominant one is to enable the children learn about animals. It is likely that teachers organise visits to the Natural History Museum for similar reasons. The planned learning targets of visits to animal collections include other curriculum areas beside that of science (Tunnicliffe 1992; 1994a).

The leisure visitors to zoos in North America are of different socio-economic mix, less economically successful than museum visitors (Arnell, Hammer and Nylof 1976 reported by Falk and Dierking 1992: 21; Hanna and West 1989; Merriman 1991; Bitgood and Benefield 1986). A similar pattern appears to exist in England, although London Zoo has more visitors of the social classes A, B and C_1 (professional, managerial and white collar workers) than regional zoos such as Paignton (Ament 1994). However, teachers organise visits to both locations, zoos and museums, not only for curricular reasons, but also for social and cultural ones. Moreover, zoos are a safe physical environment for socialisation (Rosenfeld 1980: 35; Tunnicliffe 1992). Furthermore, children from socio-economic groups that are not traditionally museum visitors may experience something of these cultural establishments (Hanna and West 1989), a thought echoed by the following comment from a London teacher:

> 'It's a social outing, not to learn any biology; that's why we haven't got any worksheets or anything. A lot of these [children] will never get out again to see this, so we look on it as a social visit,'
>
> (Comment from teacher in charge of multi-ethnic group of seven year olds from a London School. February 1992)

It is important to remember that the prevalent perception in society that a zoo is the place to take younger children for a day out whilst a museum is place for learning (Linton and Young 1992: Bitgood and Thompson 1987), may also influence the expectations of the chaperones on a school visit, and even the organising teacher. Moreover, the predisposition of the adults towards the institution to be visited may influence the content of the conversations of school groups within the two locations, zoo and museum. Furthermore, the type of visit, family or school, is likely to set the tone for the conversations because of the expectations of the participants, with leisure visitors having unstated learning goals whilst the school visits have defined goals and objectives which can be obtained by teaching methods.

The content and form of the conversations of the two distinct groups, school or family organised, may vary. Conversations of school groups with an adult are more likely to focus on particular topics than the conversations of family groups involved in socialising. However, parents, or other adults, such as grandparents, accompanying children may assume the role of 'teacher' during family leisure visits. The 'teaching' during school visits may be accomplished not only by teachers. Parents are often in charge of groups, acting in the place of the teacher, and it is plausible to expect that these parents will assume the 'mantle of a teacher' in these formal educational visits and that the content of the conversations is likely to resemble those of the teacher rather than those of adults accompanying children during a leisure visit.

1.1. 2 The expectations of children

Expectations for visits are not the prerogative of the adults who organise them: the schoolchildren have expectations too and anticipate events that will occur (Falk and Dierking 1992: 29-30). If the expectations of children are not met, they judge the visit a disappointment, giving rise to negative comments (Barker and Wright 1955). School children begin their visit with two agendas, a child-centred one anticipating fun and visits to the gift shop for example, and a school-oriented one expecting a new learning opportunity that utilises the expertise of the collection (Balling, Falk and Aronson 1992 cited by Falk and Dierking 1992: 30; Birney 1988).

A lack of pre-visit orientation and planning by adults impedes the realisation of at least some of the expectations of children (McLaughlin 1984). Preparatory work can overcome the 'novel field trip experience' generated by visiting a new site and affect, in a positive way, the use of time at the site by the pupils and their subsequent learning (Falk, Martin and Balling 1978; Falk 1982; Falk and Balling 1982; Martin, Falk and Balling 1981; Falk 1983; Falk and Dierking 1992: 26). Pre-visit work results in more positive attitudes and responses in pupils about the field trip. Gennaro (1980) and Screven (1986) discussed three types of advanced organisers for general visitor use, maps, conceptual pre-organisers and an overview of the exhibits. Moreover, unfamiliarity of a site has an effect on the movements, other behaviours and thus conversations of visitors, although Falk, Martin and Balling (1978) and Wright (1980) show that the use of pre-visit preparatory material (advance organisers) does help to structure the visit for school children and render the visit more meaningful and efficient in terms of directed movements. However, in contrast to the 'novelty' effect explored by Falk and his colleagues, Wright et al. (1980) point out that the differences in the environment can cause the children to learn as much or more in a museum than in a classroom within the same time period.

Well planned visits are remembered by the pupils (Wolins, Jensen and Ulzheimer 1992) and Wright et al. (1980), argue that reinforcement work, before and after the visit, both links the experience of the children into the school curriculum, and provides an opportunity for schoolchildren to see artefacts or exhibits, which can not be experienced in school.

Education is also concerned with the handing-on of attitudes and cultural norms. Several studies have shown that children acquire new or change their existing attitudes towards animals after visiting a natural history museum and zoo (Birney 1986) or only a zoo (ten Brink 1984). It is reasonable to anticipate that children accompanying families hold expectations similar to those of school children, and that experiences remembered from previous visits affect those for a forthcoming one (Bitgood and Bishop 1991).

In summary, visits to museums and zoos are organised by school teachers and families:

- with mixed expectations of socialisation and experiences that can be obtained from the context of the visit but which are independent of the content of the zoo or museum;
- for cultural reasons for children to experience something which may be outside the experiences they can expect from their socio-economic background;
- for overt zoological (science) education reasons, such as learning about the extent of biodiversity, practising categorisation of animals or for studies within other areas, such as Art or English;
- for affective reasons, such as visiting animals in general, as a 'treat', to see 'the real thing', or to look at a specific animal that the group or individual has adopted through the zoo 'adopt an animal' scheme.

1. 2 LEARNING IN ANIMAL COLLECTIONS

Families and primary school groups undertake their visits to animal collections with a rationale that embraces learning of some kind. However, this study focuses on what children *notice* about animals when they are looking at them, not what they recall about the animals *after* their visit. If we, both teachers and the museums and zoos, are to assist children in constructing their own concepts about animals, we need to know what it is that they notice, for this reflects both their interest and existing knowledge, and would form the basis on which learning could be built (Black and Harlen 1993). Therefore, in this section I review aspects of learning with particular reference to animals as specimens.

1.2.1 Instruction or education?

The Natural History Museum and the London Zoo, were both established for the instruction of visitors. Professor Forbes, formerly Professor of Botany at King's College, London, writing about the institution in 1853 that became the Geology Museum, now part of the Natural History Museum, points to this emphasis when he comments

> 'I shall avail myself of this opportunity to offer some remarks upon the leading and characteristic features of the institution, considered an educational Museum, and to make some observations upon the instructional uses to which Museums may be advantageously applied.'
>
> (Forbes 1853: 3)

Whilst children may acquire new knowledge during their visit, they will also build on what they already know. We must remember however, that the word 'learning' is used synonymously with associated terms such as 'education' by many institutions (Falk and Dierking 1992: 98). It is important to realise the distinction between a transfer of facts and learning. The term 'education' is used by zoos and museums to refer to the provision of information, rather as a railway or airline timetable provides information to travellers but does not seek to educate them, merely inform (Kelsey 1991). However, if education, meaning learning, in terms of constructing understanding, is to occur at exhibits, learners must be able to place the exhibit in a conceptual framework which is meaningful to themselves and it is important to understand ways in which existing concepts may be altered through interaction with an exhibit (Van Luven and Miller 1993).

Hence, we need to be aware of the pre-visit content of visitors' knowledge and the means by which this may be changed through looking at the animal exhibits alone or with companions, including teachers, and attending to the interpretation provided by the institution. First of all, we need to consider the process of learning in general and how it may apply within animal collections.

1.2.2 Learning

Science teaching in schools has been influenced in the last half century by a series of ideas which are applicable to learning out of school. Of particular significance are those of the constructivist school of psychology, based around Kelly's personal construct theory (Bannister and Fransella 1971), which recognise that education is an *active* process between taught and teacher, and also those which recognise the importance of conversations in learning. Vygotsky (1962) concluded that *spontaneous* concepts were developed by conversations within the child itself about both previous experiences and new personal ones, but that *scientific* concepts were developed through formal 'school type' dialogues between the child and teacher. In this manner social interaction produces cognitive development and children find the explanations provided by their peers easier to understand than those of teachers (Champagne and Bruce 1991).

Such scientific concepts, developed as the result of social interaction between student and teacher, are, in Vygotsky's view (1962), stimulated by various tasks such as:

- problem solving
- defining a taxonomic system
- reaching consensus on an explanation for a physical phenomenon.

However, as Adams et al. (1989) point out, there is, in museums, also a responsibility for visitors to enter into the learning experience, otherwise learning cannot occur.

Science educators concerned with children's learning identified a learning cycle whose use is believed to enhance knowledge acquisition (Karplus 1977; Champagne and Bruce 1991). A variation of learning cycles was put forward Lawson 1988; Lawson, Abraham and Renner 1989) and Lawson's original form of three cycles has been combined into one (Barman 1989) which has been applied to learning in a zoo (Barman et al 1992). Moreover, using the learning cycle in a museum or zoo, where children can more easily work in groups, recognises that learning is not an isolated process but a social one, and that the social dynamics in operation influence learning (Chase 1975).

The constructivist approach strives to develop the personal ideas of the children (Driver 1983; Brumby 1982). Skilled teachers help learners to reorder their previously learnt knowledge and many parents follow such a course of action instinctively. Examples of an adult helping a child develop his ideas in an informal forum can be identified in segments 43 and 49 of the Michael transcript.

43. Sea Anemones

Aunt: What about the red things on the rocks.
Michael: What are they?
Aunt: Sea anemones, can you see the mouth? There in the middle of the tentacles.
Michael: What do they eat then, fish?
Aunt: No, they eat small bits in the water. Have you heard of jellyfish?
Michael: Yes, so when the sea anemone turns over it's a jellyfish

49. Jellyfish

Michael: What are jellyfish doing here?
Aunt: Look! They are just like you said. [referring to conversation 43]
Michael: Yes!

There are inter-related preconditions for learning (Osborne and Freyberg 1982: 108): These include:

- the teacher needing to understand three views of the topic, their own, the scientists' and the children's;
- opportunities for the children to explore the implications of a concept, within an everyday situation;
- the participation of the learners in a self-clarification of their own views early in the teaching.

Such an approach provides a child centred framework within which children can learn at exhibits assisted by their accompanying adults, peers *and* the institution.

The application of contructivist theory to teaching in schools or museums and zoos requires that teachers employ a different orientation to their work than has been done previously. Instead of the *content* of what is to be *taught* being the central concern, the focus is on the *substance* of what the pupils *learn*, and the *meaning* the learners *construct* from the experience (Driver et al. 1994; Hein 1995). Such an awareness of the learner's construction of meaning is of great importance to museum and zoos *if* their visitors are to achieve meaningful learning, but first of all we need to establish a starting point, the content of the exhibits to which the learners attend, which is the focus of this thesis.

Generative learning takes the reordering of knowledge a stage further and encourages learners to generate further understanding by attention to specific and relevant aspects of a concept (Osborne and Wittrock 1983). White and Gunstone (1992: 13) embrace constructivism and the generative learning approach and suggest that meaning is constructed during learning, whatever the task and location, through three types of interaction: thoughtful reflection by self; incidental learning acquired from another situation; and information constructed under the guidance of a teacher. Children however have to generate links between the stimuli of new information and their existing perceptions; they have to generate learning (Osborne and Wittrock 1985).

The content of what is learnt is important. Children hold ideas about phenomena, known as '*children's science*' (Gilbert, Osborne and Frensham 1982), the following features of which are particularly important to this study:

- the use of everyday language to verbalise the science concepts in their own terms;
- egocentrism;
- anthropomorphism.

Selection by specialists of the concepts to be taught to primary children is critical in developing the children's learning. However, the concepts taught to primary children need to be relevant to everyday life and their experiences and be such that the children can be actively involved, using processes in the generation of their learning. Black and Harlen (1993) point out that Osborne and Wittrock's generative learning model pays little attention to the need to analyse the concepts to be learnt so that a superordinate idea is gradually achieved through a number of subordinate ideas that merge as the child acquires them and constructs meaning. The challenge to museums and zoos is to identify the concepts that children can acquire through viewing the exhibits and assist them in the learning process.

Furthermore, science education is now recognised by some as a process of enculturation, in which 'the aspirant members of a culture learn from their tutors' and 'novices are introduced to a community of knowledge through discourse in the context of relevant tasks', (Driver et al. 1994). This portrays the learning experience as a dialogue process and is part of a cultural continuum in training of customs and behaviours.

An understanding of the nature of this model of learning has profound implications for both visitors and museums and zoos, as learning cues need to be provided which help the visitor construct further meaning for themselves about the animal specimens. Such an approach has been adopted by designers of educational material for certain topics studied in Indianapolis Zoo (Barman et al. 1992), but was not used by teachers involved in the conversations that were studied for this thesis.

From the perspective of the social constructivist, conversations *are* key in the social construction of knowledge, their effectiveness depends both on the *tasks* around which the dialogue focuses and the *structure* of the conversation. Glynn, Yeany and Britton (1991) suggest that to optimise learning

> 'teachers should require students to reason scientifically. One way they can do this is by modelling scientific reasoning for their students. In effect, teachers and students should become collaborators in the process of scientific reasoning.'

Therefore, conversations generated by teachers and chaperones and focused on the animal exhibits need to be thoughtfully and accurately constructed to contain interesting, pertinent questions about the science associated with the specimens. Activities designed for children to complete in groups should develop constructive dialogue amongst the pupils. The content of conversational fragments can help us to analyse whether this is so, but we must remember that learning at animal exhibits is not necessarily the same as learning in the classroom, for the physical and social contexts are changed and these alterations may affect the content of conversations and the way learning is introduced. What do we know from existing data on conversations about learning? The few studies on interactions of leisure visitors at museums, for example, McManus (1987) and Stevenson (1991), and animal collections (Rosenfeld 1980; Taylor 1986; Hensel 1987) indicate that social opportunities for the construction of concepts do occur during leisure visits to zoos or museums, (Rosenfeld 1980: 60, 66 & 77). It is however, apparent that in these leisure groups discussion is predominantly at a factual level, instructional rather than constructive.

Transcripts of conversations from previous studies also show that, within animal collections, the accompanying adults draw the attention of the children to exhibits in a manner reminiscent of the way in which they themselves were taught (Birney 1988), although, conversely, Dierking (1987) found that questions were the predominant form of language used by parents and children during family visits to a museum. Diamond (1986) recognised that parental 'teaching' behaviours at interactive, not animal, exhibits, focused on parents 'showing and telling', a process achieved through ostensive language and behaviour. Behaviour of families at animal exhibits seems to follow a similar ostensive pattern (Rosenfeld 1980; Hensel 1987: 86) although families in museums display a spectrum of family learning styles ranging from collaborative learning through to dispersal and individual learning at exhibits (Falk and Dierking 1992: 11; Dierking and Falk 1994). The way in which chaperones interact with pupils of school groups is scarcely documented (Parsons & Muhs 1994). The differences in context, between school and institution, family and school visit, affect the content of conversations and behaviour of adults and children and any learning that occurs may be achieved in a style different from a formal learning situation within the school building.

1.2.3 Formal and non-formal learning

The learning process of constructing meaning can occur whatever the location but the emphasis it is given, and the way in which it is achieved, depends on the rationale for the visit and thus the social composition of groups. There are differences between learning that occurs within the school building and that which occurs elsewhere, in places such as in museum or zoo or other sites such as field centres. Other researchers have identified the out-of-school learning as non-formal learning, for example Bitgood 1989; Lucas 1981; Maarschaalk 1986. In contrast, learning within the school, even out of the classroom, is part of the child's educational entitlement and is part of a planned learning experience and is formal learning. It is within the jurisdiction of the school. Learning with families, which occurs in leisure time and not under the aegis of the school and curriculum requirements, will be referred to as non-formal learning. There are similarities between the formal learning that occurs within the zoo and museum and the non-formal learning that occurs within a family or leisure visit. These are:

- the director of the learning - the learner may have a 'teacher' or 'facilitator', or the learning may be self directed, but working towards goals set by somebody, the school or parent for example;

- the learning has stated educational objectives. These are very clear for school visits (Marshdoyle; Bowman and Mullins 1983; Tunnicliffe 1994a), and vague for family visits (e.g. Rosenfeld 1980), and some learning may be *incidental;*
- other reasons of the visit. Schools organise formal out-of-school learning experiences to make use of institutions, e.g. zoos, which provide facilities for experiences other than cognitive learning (Tunnicliffe 1994a). Likewise, families have a dual agenda of learning and social interplay (McManus 1994).

Moreover, the site of the learning is likely to be visited only once, although repeated visits to the same location by the same school group have been shown to increase the learning that occurs (Wolins et al. 1992).

Expectations, for the visit, the main way in which information is obtained, and the type of learning stressed, differ between family and school visits. Family visits are distinguished by a *process* of having concrete experiences that promote social exchange, whereas school learning is *product* oriented, setting out to achieve specific goals and frequently focused on written products. The most significant part of family learning is the affective component, but in the classroom, the cognitive component is the most important and it is expected that this is so during the school field trip. School based learning is 'information-rich, experience-poor' in direct contrast to the family experience which is not oriented to the classroom style and is 'experience-rich but information-poor' (Rosenfeld 1980: 77).

Leisure visitors know that learning *may* occur during a visit (Rosenfeld 1980: 39) and visits offer family visitors with young children a half-way point between formal learning in a class and absolute leisure. The occasion presents more of an opportunity of having a shared, common, 'enjoyable' learning experience than many other activities that families do together, such as picnicking or swimming (Rosenfeld 1980: 37) and the museum or zoo visit appears to be used by families to 'acquire new information'.

The school outing is unique and differs in a number of ways from the formal school learning situation because:

- there are more adults to look after children, thus a child will have more adult attention. The Natural History Museum recommends a ratio of one adult for every five children and many of the groups that I observed were of this nature;

- the children have the opportunity to work with peers in a less formal manner;
- the children are expected to move from exhibit to exhibit;
- the learning opportunity is a more physically active one;
- the learning environment provides a constant sequence of new perceptions;
- collaboration on worksheets etc. is possible (McManus 1985) even if not permitted;
- the school routine is not applied, the visit has its own inherent timetable;
- gathering of sensory perceptions is different from that at school;
- there is more freedom for the children to choose their agenda than in school;
- lack of tight social control dialogues by teachers;
- the visit focuses on objects (Falk, Koran and Dierking 1986).

On the other hand, the school field trip is different from the leisure experience of families to the same site because:

- there are fewer adults per child than occurs in many family visits. Michael and his brother for example were accompanied by four adults, an adult-child ratio of 2:1;
- the children may not know the adults and are unlikely to have shared previous experiences and a shared culture;
- there are formal learning expectations;
- the timetable is defined by the teacher and there is less freedom for children to choose or influence the agenda than in a family visit;
- preparatory and/or follow-up work is expected from the children;
- the schools may employ means of enhancing the learning of the children experiencing a field trip, such as advance organisers, thus

From a constructivist perspective the learners' knowledge about the topic of study as they begin their visit is a critical factor in any subsequent observations and learning. Studies suggest that significant cognitive learning can occur on field trips if the novelty factor (Falk 1983) is overcome and furthermore, that such learning can be enhanced by pre-visit instruction material (Gross and Pizzini 1979; Gennaro 1980; Price and Hein 1991). The 'novel setting' experience and associated behaviour may also be reflected in the content and form of the conversations for family groups, although research data for such a phenomenon only exists for school groups (Falk, Martin and Balling 1978; Kubota and Olstad 1991).

Essentially however, the school outing to a museum or zoo is more of a social experience, reflecting the family leisure visit, than traditional classroom learning sessions because conversations between members of the group are the predominant activity, which emphasises the social aspect of the learning experience. However, the content of the conversations of families has component parts. A survey of the existing literature on such conversations (Rosenfeld 1980; Hensel 1982; Hensel 1987; Taylor 1986; Hage 1993) shows that the content of conversations at animal exhibits fall into four major categories: exhibit-access, animal-focused, management of the group and social conversations. Some utterances in a conversation have a dual role, for example, exhibit-access conversation words, such as 'Look!', also serve in a management role (Hensel 1987: 102). It is likely that the content of conversations of school groups possess similar categories of topics of conversation albeit with a different emphasis.

1.3 BEHAVIOUR OF VISITORS AT ANIMAL EXHIBITS

The nature of learning tasks depends on the rationale for the visit and the interest of both adults and children in looking at the exhibits provided by the institution. Moreover, the way in which visitors behave is determined to some extent by the rationale for the visit and the companions with whom the visit is made but it also reflects the site and type of exhibit viewed. However, there are some general principles of visitor behaviour which can be drawn upon to provide an understanding of visitor behaviour at animal exhibits. Behaviour of visitors will be considered in terms of their physical movements and their conversations and the stage of the visit at which they are observed.

1.3.1 Physical behaviour

There are three main factors within a museum or zoo, besides the reason for the visit and those associated patterns of behaviour, that affect the movements of visitors around the museum or zoo. These are:

- the site, i.e. museum or zoo;
- the type of exhibit;
- the social composition of the group.

Moreover, if visitors want to see a specific exhibit, they are likely to behave differently and hold a more focused conversation when they find their target exhibit than visitors who do not come to look at anything in particular. Leisure visitors move to *find* something to look at in which all group members are interested whilst school visitors often have exhibits which they are *required* to see and about which they may have tasks to complete.

A pattern exists to both the physical movements of visitors and duration and content of their conversations at exhibits which may be influenced by the type of exhibit being looked at, the amount of information given and what the visitors already know about the animals. Falk (1983a) suggested that visitors arrive with a time agenda for each exhibit but, conversely, Riddle (1980: 97) and Hensel (1987: 123) argued that the 'dwell-time' at an exhibit is limited, not by a time budget, but by the visitors' knowledge about the topic, although Korn (1994) pointed out that the conversations in front of an exhibit may not be connected with that exhibit at all. However, McManus (1987) found that *all* the conversations that she analysed, and which were generated at exhibits, were *related in content to the exhibit.*

It is likely that the content of conversations at animal exhibits is also related to the rationale of the speaker for undertaking the visit, as well as the stage, measured by time, into the visit at which the comment was generated. The exhibits are not the focus of all visitor behaviour for they allocate their time between looking at animals and other activities such as eating (Rosenfeld 1980; Falk 1982; Falk 1983 a and b; Falk, Balling and Martin 1985; Hensel 1987). There are some general patterns of visitor movement that have been recognised, such as turning to the nearest exhibit and speeding up as the exit is approached (Melton 1933 & 1972; Yoshioka 1942; Lakota 1975: Shettel-Neuber and O'Reilly 1897), walking more quickly when there is one way traffic flow (Bitgood et al. 1985) and a preference for walking down hill (Churchman 1984).

Furthermore, activity and noise around an exhibit attract other visitors (Bitgood et al. 1986; Patterson and Bitgood 1987). Although it is unlikely that most aspects of visitor behaviour in institutions are referred to by visitors within their conversations of this study, specific features that initially attract the visitors may be mentioned because they are perceived through a sense other than sight (Dale 1953). The way in which visitors behave may be reflected in the content and form of the conversations which may vary with the stage of the visit, i.e. beginning or end, and the type of exhibit viewed as well as the rationale of the visit. Wolf and Tymitz (1979) used the language of travel to develop a taxonomy that categorised the behaviour of museum/zoo visitors, whilst Falk (1982) established a similar typology using the language of shoppers (Table 1.1).

A number of factors associated with the exhibit affect the behaviour of visitors. One of the most important at live animal exhibits is the observable behaviour of the specimens (Rosenfeld 1980; Bitgood and Benefield 1986; Bitgood and Thompson 1987; Bitgood, Benefield, Patterson and Nabors 1986). The type of exhibit, e.g. static or participatory, walk-through or walk-past (Koran, Koran and Longino 1986), and the behaviour of other visitors at exhibits who act as role models (Koran and Koran 1983; Falk and Balling 1985; Koran, Koran and Longino 1986; Koran, Koran, Foster and Dierking 1989). All of these aspects affect visitor behaviour.

1.3.2 Influence of group members on behaviour

Interaction between members of the group has an effect on the behaviour of visitors at the different types of exhibit and, vice versa, individual members of the group can determine patterns of the behaviour of the group. Similarly, the gender of individuals is an important factor in the influence of individuals on their group. However, it is the leader of the family group who determines the direction in which the group move at the beginning of the visit, and when a male adult is part of a group, he is dominant (Rosenfeld 1980: 46; Falk and Dierking 1992: 43). The type of companion who accompanies the child, be they parent, chaperone, teacher or peer, affects the form of the conversation. In an interactive science centre, mothers named phenomenon significantly more often than did children, and parents read the labels, passing the information to pass on to their children and these conversations contained management directives (Diamond 1986).

Several studies, e.g. Diamond (1986) and Rosenfeld (1980: 46), observed that adults were much more likely to control the pace of the family visit than the children, and, although children were allowed to lead their group to an exhibit, they rarely led away from it, although Michael chose some of the exhibits at which the family stopped by opening a conversation, e.g.

22. At the Skinks

Michael: Oh! Look at these....',

Family adults control the movements of their groups through using ostensive actions (Hensel 1987: 170) and what Sinclair and Coulthard (1975) call directive conversation. e.g. in segment 36 at the catfish, the Uncle initiated the exchange at an exhibit by ostensive language, 'See these in there? They are catfish, can't you hear them meowing?', but Michael showed little interest and moved the conversations, and thus the group continued walking.

Michael : I don't like these fish.
Aunt: Aren't sharks fish?
Michael: No! They are more like different fish. These sort of fish are not interesting.

The above exchange shows that the attempt by an adult to influence what children look at is not always successful.

Falk and Dierking (1992: 44) report that Benton (1979) investigated the interactions of family group members with each other in sites which included a zoo and a natural history museum and concluded that the time spent at exhibits was influenced by the style of leadership of the family. Not unsurprisingly, Benton found that less time was spent at exhibits when there was overt disciplinary behaviour exerted by the adults. An example of such talk occurred in Prologue segment 12 when Grandma directed Michael, 'Get your feet off please, you're not meant to be on there'. Krantz and Bacon (1977) report that the presence of adults suppresses behaviours which relate to children's enjoyment. Thus the content of conversations may indicate when individuals are seeking to control or influence the behaviour of their group through dialogue, as Michael does in the above example. However, although the uncle was not successful in engaging Michael's attention at the catfish, Tough (1977: 37) points out that children do attend to that which adults point out and therefore what adults do point out to children during their visit is crucial to their learning.

1.3.3 Conversational behaviour

Reviews of existing transcripts at animal exhibits, e.g. Hensel (1987), showed that conversations are observational commentary interspersed with management and social utterances, employing everyday terminology and experiences. However, two factors other than the site and type of animal specimens being viewed, live, preserved or animated model, and the reason for their visit, leisure or formal educational, are important in influencing conversational behaviour. Firstly the people, family or school associates, with whom the visit is made and secondly the age of the children. Dierking (1987) pointed out that family behaviour, which embraces conversations, was influenced in a museum both by exhibit type, and the composition of the family group. Furthermore, McManus (1988) showed that the sex, age, and generation of group members determined both language use and the pattern of the conversation amongst visitor groups she studied in the Natural History Museum, two of which are directly relevant to this thesis, child peer groups and family groups. Moreover, the nature of the planned experience, which may reflect the rationale for the visit, affects conversation, and, if children have a definite task or activity in which they are participating their conversation is concentrated on them. McManus (1985) noted this phenomenon for early secondary aged children whose conversations focused around their worksheets during a visit to the Natural History Museum.

1.3.3a Influence of adults on the conversational behaviour of groups

The presence of an adult has a significant effect on directing the conversations of children within a family group. However, the way in which the content is discussed is affected by all the members of the group and there is a difference of opinion about the predominant form of language used. Diamond (1980) found that, in an interactive science centre, parents *directed* the child with instructions. Conversely, Dierking (1987: 66) noted that questioning of their child by parents was the most frequent overall form of interaction in a traditional museum where there were some participatory exhibits in one gallery. Furthermore, Hensel (1987: 100-104) identified Teaching-Learning conversations, initiated by the adults, amongst the dialogues of families looking at fish in an aquarium. If the children are being taught, either by relatives during family visits, for 'learning' something is an important activity during family visits (Rosenfeld 1980: 77), or teachers, or their representatives, on educational visits, it is to be expected that such conversations will be characterised by particular conversational behaviour.

The complexity of verbal tasks set by adults, ranging from the straight forward 'What is it?' question, which can be argued is not a task but an everyday response to the needs of people to categorise their world (Bruner et al. 1966; Britton 1970), to relational and logical discourse, which helps a child develop an argument about specimens on view, produces a different type of conversational form.

The presence of an adult with children, as McManus (1988) showed, affects the conversational behaviour. The adults may be from the school or from the museum or zoo. A member of the institution affects both style and content of conversations and resembles the conversational patterns shown by parents (Diamond 1986; Dierking 1987). Many museums and zoos have volunteer guides, often referred to as docents within the literature originating from the USA. Docents affect the content of conversations through the type of questions which they ask, altering their form according to the age of the pupils (Lehman 1986). A structured or informal docent-led tour at a zoo produced different behaviours and forms of conversations (Birney 1988). Stronck (1983) showed that pupils who accompanied a docent in a tour of a museum learnt more than the students who were unaccompanied, but in retrospect the latter group held more positive attitudes toward their visit. Boywer, Chen and Thier (1978) showed that children could work at educational tasks in an effective learning way in an out-of-school setting with a paraprofessional paid employee but not a qualified teacher. Furthermore, the interaction of the paraprofessional with the pupils was *unlike* that of a teacher, in terms of number and type of verbal interactions.

The conversational patterns generated by school groups with docents resembled those shown by parents with family groups (Diamond 1986; Dierking 1987), where the dominant form of conversational interaction was adults asking questions. Conversely, zoo leisure visitors asked docents many questions, particularly about unfamiliar animals

(Birney and Shaha 1982), indicating that if answers are available from an easily accessible and user friendly source, older visitors avail themselves of the facility and prefer talking and listening as a means of obtaining information to reading declarative text which is inflexible in the information which it provides.

There is little work in the literature about the composition of school groups and the effect of the type of the adults from school accompanying them on the conversations of the groups. Birney (1987: 48) documents that school children frequently regard adults who accompanied them around a museum as managerial, and the children responded to their presence by behaving, and presumably talking, differently than they anticipated they would had they been unaccompanied by an adult. Furthermore, the presence of a chaperone has an impact on the way that school groups behave during their visit (Parsons & Muhs 1994) and presumably their conversational content. Children and the adults who accompany them, be they parents, teachers or chaperones, do not embark upon a visit to an animal collection knowing nothing about animals and they appear to have a clear view of their task, to look at animals.

1.3.3b Influence of age of the children

The age of the participating children affects the conversation in two ways, conversation generated by the children reflecting their interest in certain topics and their need to find out something and those aspects of conversational behaviour initiated by adults in response to the age of the children. These factors embrace two areas. Firstly what the children notice, and what the adults think is appropriate to draw to their attention, and secondly in the conversational behaviours that children and adults use.

Young children are attracted to colours and shapes, the salient features (Inhelder and Piaget 1964: 7; Tversky 1989). Thus it is not surprising that Dierking (1987: 73) noted that a greater interest in colour in exhibits is shown by children under five years and in shape by children over five years of age. Hensel (1987) showed that the content of conversations generated at aquarium exhibits increased in content with the age of the children in the group.

Young children have predominant speech forms. Hart and Risley (1978: 407-432) identified the occurrence amongst nursery children of 'finding out' dialogue where the exchange was initiated by the children, usually through a question whereas Tizard, Hughes, Carmichael and Pinkerton (1983) found that questioning was the predominant behavioural form in the home amongst young children .

Adults alter both the pattern and content of their speech when talking to young children. Bruner (1983: 76-79) notes that there is a specific 'labelling' pattern of conversations of a characteristic sequence of utterances between a very young child and the care giver, usually the mother. The sequence has four different forms of utterance, - *vocative* (e.g. 'Look!'), *query*, (e.g. 'Do you know what this is?'), *label* (It's a bear), and *feedback* when the child has repeated the word,(e.g. 'Well done!'), made by the care giver. With children older than infants, but younger than school aged children, adults adopt another characteristic pattern of conversation referred to by Wheldall and Glynn (1989: 134-142) as 'motherese'.

The reason for a visit is likely to influence the content and form of the conversations of both adults and children so that, even if age related patterns of conversation are heard, it is to be expected that the conversational content of the school groups will contain both more questions and statements about the animals. It is also likely that school groups will mention from where the conversants obtained their information (knowledge source comments) and greater content about the attributes and names of the animals. The educational tasks, not social interaction, are likely to be the main focus for school groups, when an adult is a member of the group, pupil-only groups may have less of an emphasis on content and more of one on emotional responses to the specimens. Both school and family are likely to make reference to conceptual pre-organisers, as Michael does in segment 66. In that exchange he explains that his ability to identify the Golden Lion Tamarins is because he acquired knowledge about them before he came, using a book that he had been given in anticipation of the zoo visit. School groups are likely to have prepared for the visit through classroom studies and children, and accompanying adults, may refer to such work.

1.3.4 Stages of visits

The stage of the visit affects the way visitors spend their time, hence the pattern of their movements and thus the content of their conversations about the exhibits (Falk and Dierking 1992: 58). If such stages are also applicable to school visits, the type and content of conversation amongst a group may vary according to the stage of the visit. The stages of a visit are summarised in Table 1.2 which indicates which are likely to apply to school groups.

Table 1.2

The phases of a museum visit, after Falk and Dierking (1992: 58), with the likely similar behaviour of school groups added. (* indicates that the behaviour is likely to be as indicated for that column category)

Phase Types of visitor	1. Orientation phases (3-10 minutes)	2. Intensive looking phase (15-20 minutes)	3. Exhibit Cruising phase (20-45 minutes)	4. Leave taking phase (10 minutes)
The first timer occasional visitor (Four phase visits)	*	*	*	*
The occasional visitor (Four phase visit)	*	*	*	*
Frequent visitor (Two phase visit)		*	occasionally frequent visitors cruised	*
Organised groups with a guide from the zoo or museum (Two phase visit)		* guided tour		*
The post tour visitors. If they stay on their behaviour resembles the first timer's visit of four phasse	*	*		*

Unlike the usual family group, members of school groups visiting a zoo tend to fulfil their tasks, irrespective of inclement weather or other adverse factors (Williams 1991).Without a task, conscripted school children, when in groups without an adult, become 'wanderers, without a focused occupation' (Ricketts 1991).

The structure for the 'intensive looking' phase of school children is frequently provided by prepared worksheets (Riddle 1980; McManus 1986). The conversations between children when worksheets are in use would be expected to reflect a higher number of references to both attributes of animal specimens and the names of animals as the children sought the 'answers' using the text on the worksheets or the labels at the exhibits as prompts and sources of information. Visitors are likely to alter their behaviour as they become tired (Williams 1992) and such a change applies both to pupils and

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accompanying adults and families and may be reflected in the content of their conversations. Diamond (1985) noted a behaviour change in mothers in the last quarter of the visit within a family visit and the content and form of the Prologue transcript reveals changes as the visit progresses. Thus, there are definite phases of different activities within a whole visit, and, whilst there is an absence of data on the phases of a school visit, it is important to be aware that these phases may be present because the nature and content of the conversations of the groups may vary according to the activities in which they are involved and the phase of the visit at which they occur. Since few studies examine the content of a whole visit, 'phase differences' may be important in explaining apparent discrepancies between studies and heterogeneity within studies.

1.4. KNOWLEDGE OF ANIMALS

London Zoo and the Natural History Museum, are centres of research and exhibit specimens for the public in accordance with their mission, which is, ostensibly, the public understanding of zoology. Zoology though has developed in the twentieth century from being concerned with identifying individual animals to a view of the species as the most important and dynamic unit of biology and related issues such as conservation biology. However, the evidence outlined above suggests that visitors typically come to *experience* animals and interpret the specimens from their own knowledge, not to be taught by the museum and zoo.

1.4.1 Zoological knowledge

Visitors enter a collection of animals already knowing something about the specimens, and, as Linn (1981) points out, in a successful learning situation outside the classroom, each visitor brings a unique level of relevant knowledge and interest. Visitors inevitably begin to view and make sense of the specimens in the zoo or museum using some pre-existing knowledge of at least 'everyday animals'.

The zoos and museum label the specimens with the scientific name, not that used by lay visitors, and additional information is provided about the animal's family, or other superordinate group, and, particularly in zoos, facts of the diet, natural habitat and endangered status. Whether or not the visitors, school or family, are interested in this information and use it in their conversations will be examined in later chapters. It is, however, important to establish the information about animals that the visitors are likely to possess before they look at the animals because it is *this* existing knowledge which will form the basis for the observations that visitors generate. As Falk and Dierking (1992: 100) pointed out, people look at what interests them. However, in order to talk about aspects of animals that catch their attention, visitors have to be able to recognise the whole animal, name and group it according to some system, which is a taxonomic skill, and be able to recognise and name the constituent parts, a process referred to as partomony (Tversky 1989), in order to identify an animal.

The existing knowledge that visitors bring to their visit is acquired from their earliest years and subsequently enlarged. Children learn about animals in their immediate environment from their infancy, (Rinsland 1946; Nelson 1974; Anglin 1977; Keil 1979), learning both to recognise types of animals and a basic name for them (Rosch et al. 1975; Brown 1958; Rosch et al. 1976; Mervis and Rosch 1981). Berlin (1978) has shown that the basic name used to identify an object is most often that at genus level. The analysis of the data collected within this present study should indicate whether the genus level of the animals is the basic term used by the primary children and their accompanying adults when referring to the specimens (see Table 4 .3).

The basic name learnt first by children is usually the middle level in an everyday hierarchy, hence children learn the word 'trousers' before they learn the superordinate category 'clothes' and the subordinate category 'jeans' (Cameron 1994). Members of a basic category have definite characteristics. As Markman (1989: 66) writes:

> 'In short, basic level categories provide a good compromise between two different goals of categorization: (1) maximising similarity between category members and (2) minimizing similarity with members of other categories.'

Cameron (1994), based on Lakoff's work, suggests that basic categories have the following characteristics:

- objects which are category members and look alike in overall shape share the same level of the name, e.g., middle level of three possibilities;
- are the highest level where a mental image can reflect the whole category;
- is the level at which people, when tested, will identify the category of members fastest, e.g. in everyday terms, people categorise the idea of a chicken as an animal faster than they categorise it as a bird (Smith and Medin 1981: 52).

In terms of communication the basic term is:

- the first level named and understood by children;
- the term most commonly used in labelling something;

- the term which organises most everyday human knowledge.

Keil (1979) considers that 'animal' is one of a human being's fundamental ontological concepts. Children learn to recognise that certain 'things' are alive before they can justify the categorisation of the item (Looft 1974).

1.4.2 Alive or dead

Some confusion may occur amongst the youngest of children studied in this thesis about the nature of the animals in the museum. The traditional specimens are not alive, but have been preserved but the animated, constructed, moving replicas of once living species provide the visual cues of movement and noise, thus suggesting that they are alive.

Extensive studies of animism have elicited the criteria which young children deem an object must possess for it to be judged to be alive and known as an animal (Beronsky 1973; Brumby 1982; DeLoache 1988; Dolgin and Brehend 1984; Looft 1974; Looft and Charles 1969 ; Russell and Dennis 1940; Russell 1940; Smeets 1973; Voekes 1954; Klingersmith 1953; Piaget 1929; Laurendau and Pinard 1962). The studies reveal that autonomous movement by the object is the most often used criterion for judging whether or not something is alive although Maurer (1970) noted that the making of sound by an animal was also very important to certain children.

The animism literature sets the scene for the study of the criteria that children apply to decide whether something is alive or not and what other properties children expect living things to possess (Bell 1981). However, although movement is the important criterion in the early years, older children use the observation of movement less and less as an indicator of life and cite other biological attributes, such as nutrition, in making their decisions (e.g. Lucas, Link and Sedgwick 1979). Furthermore, compared with adults, young children almost certainly possess a *different* set of concepts which they map onto the word 'animal' (Carey 1985: 89). Clearly, in recognising living things (Brown and Thouless 1965) there are stages of *evolution* of the concept 'alive' that gradually develop into the adult's understanding of 'alive' (Bruce 1941). However, as children expect to see moving, live animals in a zoo and static, preserved animals in the museums, or animated models that have been advertised as part of specific exhibitions in a museum, such as the dinosaur diorama in the Natural History Museum, the issue for the children is not the vitality of the specimen but its authenticity. Hence, the question is not whether the specimen is an animal, but *is it 'real' or not*?, the meaning of 'real' depending on the context.

1.4.3 Real and broken

Authenticity is an important factor in children's responses and interpretation. However, there are no studies in the literature that compare children's responses to undoubtedly 'authentic' live animals in zoos with responses to preserved animals and models in museums. These distinctions, and children's understanding of the categories of animal specimens, are vital if we are to understand the potential uses and misuses of models, animatronics, preserved specimens and living organisms in zoos and museums. It is important to remember that children will resort to interpretations of the exhibit from fantasy when they have no concrete knowledge upon which to call (Williams 1983). The issue of items being 'broken' and the use of the word 'real' are important to this study. Children equate the broken state of an object to being 'dead' and use the word 'real', to apply to authentic objects in contrast to those which are deemed 'unreal' (Russell 1940; Russell and Dennis 1940). Furthermore, Tverksy (1977), working with artefacts and not with animals, showed the 'authenticity' of an object is extremely important to children as a diagnostic feature in grouping objects. Whether or not authenticity and completeness of the specimens are an important issue for children looking at all or some of the three different types of specimens, remains to be seen.

1.4.4 Attributes of animals

Attributes of animals are phenomenological and can be seen and discussed by most visitors, provided that they possess a mutually comprehensible vocabulary about the subject. The English school curriculum requires that children learn to group animals. (DFE 1995: 40 and 45) and has varied in the detail required, although in essence it has always expected children to learn to label with a name and allocate animals to named groups in a simple classical Linnean taxonomy, and to identify the key life processes. The present version of the National Curriculum, expects that primary children should be taught:

Key Stage 1 (6-7 years)	- the differences between things that are living and things that have never been alive; - that animals, including humans, move, feed, grow, use their senses and reproduce; - that living things can be grouped according to observable similarities and differences.
Key Stage 2 (8-11 years)	- that there are life processes, including nutrition, movement, growth, reproduction, common to all animals, including humans; - how locally occurring animals and plants can be identified and assigned to groups, using keys.

Although children do cite a range of attributes in their rationale for deeming an example as an 'animal' or for allocating it to a subordinate category, existing research concurs with the animism studies and shows that younger children use movement as a key attribute (Osborne, Black and Wadsworth 1992: 45). As children develop they refer particularly to legs and body covering (Trowbridge and Mintzes 1988). Other biological concepts, such as nutrition, respiration and habitat, are cited by children in early secondary school (e.g. Bell 1981) and this usage suggests evidence of taught information because, whilst the actions associated with the concepts are perceptible, the understanding of the process is not. Furthermore, young children consider intuitively that physically smaller animals are at an earlier stage in their life history than larger and similar specimens, even when the animals are of different species (Looft and Charles 1969).

Thus, children have a mixed view of the concept animal, a view that it is one based on attributes they have observed, such as structural observations e.g. legs, body covering, and behaviours, like movement and feeding, mixed with concepts, such as habitat and irritability, that they have been taught in school. The inability of eleven year old children to classify exemplars that they were given as a member/non member of a taxonomic group suggests the children had no grasp of the criterial attributes that is necessary to perform such a task (Ryman 1977). It would seem that children are being taught categorisation for a school-created animal grouping system, not scientific zoological taxonomy.

1.4.5 Language issues related to grouping animals

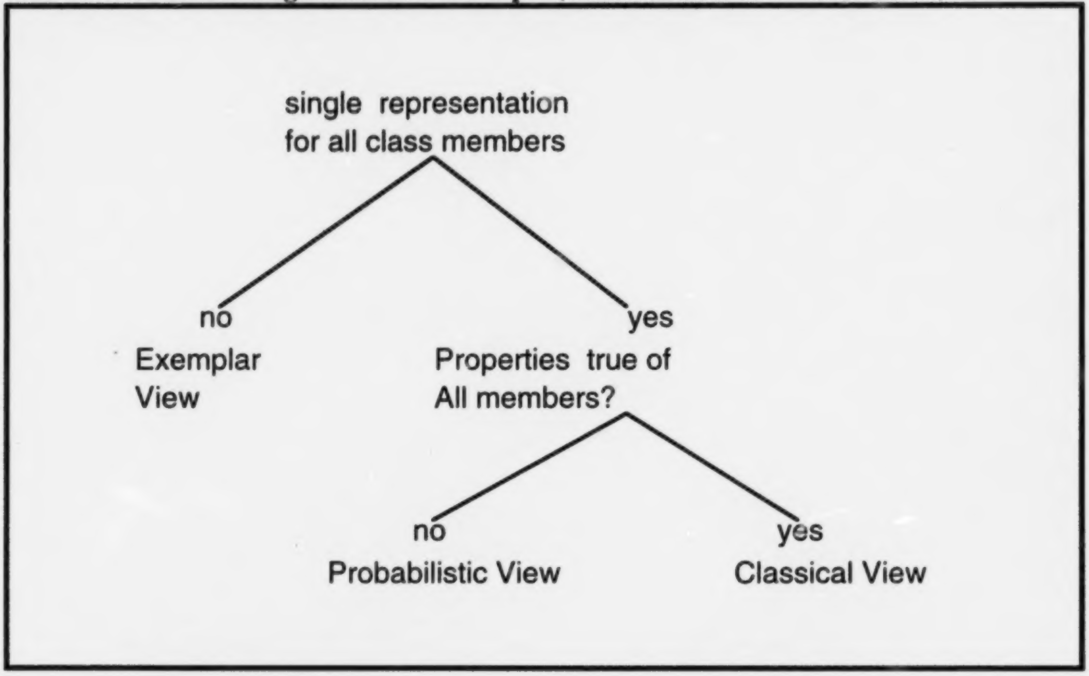
Classroom based research has established that there are language issues in children's categorising of animals. Such research has investigated the concept of 'animal' held by children (e.g. Bell and Barker 1982; Braund 1991; Mintzes 1989) and shows that English speakers have a restricted view of 'animals' that is similar to that of the everyday. The term ' animal' is restricted either to mammal, or to vertebrates of which the prototypic member is a mammal, thus children tend to under-generalise the terms used, particularly the term 'animal' (Bell 1981; Bell and Barker 1982). Villabi and Lucas (1991) showed that the confusion between everyday and 'scientific' senses of the term 'animal' did not occur amongst Catalan or Castillian speakers, and their finding raises the issue of applicability of research findings that are concerned with language from one linguistic group to another. Ryman (1977) pointed out that both inadequate concept formation and language problems contribute to difficulties in children's ability to classify plants and animals accurately. However, under-generalisation may be a consequence of the developmental age of the children (Inhelder and Piaget 1964: 7) and, to young children inexperienced in seeing a variety of mammals, any animal that resembles, for example a dog, i.e. having hair and four legs and moves, is referred to as such, irrespective of its authentic biological category. Trowbridge and Mintzes (1985) reflect that 'students consider ambiguous and often conflicting pieces of information when classifying animals, ultimately arriving at a decision based on relative size or perceived importance of body parts', for which they draw on their everyday knowledge of animals and inherent categorisation tendencies (Tversky 1989), and not on zoological knowledge.

1.4.6 Suggestions for achieving effective learning about animals

Ways in which children can be more effectively taught about animal classification have been suggested by Mintzes, Trowbridge, Arnaudin and Wandersee (1991), who argue that children would be taught classification more effectively if teachers used live or preserved specimens to teach the criterial attributes and then offered immediate feedback to their pupils to correct apparent misconceptions. A visit to the zoo or museum provides an opportunity to do just this. However, it is apparent that research about the understanding of zoological taxonomies by children has been focused on their ability to categorise as if the groups to which the exemplars could be allocated were classical, in the sense that membership demanded the possession of certain attributes (Figure 1.1).

Figure 1.1

The three views of categorisation of concepts (after Smith and Medin 1981: 4)



Whilst this is the type of classification system advocated by syllabi, it is not that of many working biologists who regard the species as the central unit and uses characteristics other than visibly perceivable structures, e.g. DNA fingerprinting, to establish species membership. If museums and zoos wish to reflect recent trends in biology as part of their aim to increase public understanding of this aspect of science the dichotomy between taxonomy for scientific purposes and that for reference in both school science and everyday life needs to be recognised and acted upon.

In conclusion, we know that children refer to a few attributes when grouping animals in the classroom. We do not know how they find out the names of unknown specimens. Neither do we know what features children notice nor whether these features are the same criterial attributes when they observe live or preserved unfamiliar animals or if the attributes reflect those deemed as significant by zoologists.

1. 5 ATTITUDES TO ANIMALS

Zoo visitors attempt to interpret animals in the light of their personal experiences both with domestic animals at home and in their childhood (Cheek and Brennan 1976), thus they are likely to prefer those zoo animals which evoke memories which can provide a focus for dialogue at exhibits and engender positive emotions.

Anxieties and emotions affect learning (Falk and Dierking 1992: 103). The response of visitors to the animals presented as exhibits in the Natural History Museum, London is largely unknown but common assumptions about attitudes to live animals will, in the absence of other information, influence the approach of exhibit designers to animal exhibits and the way in which teachers help their pupils learn about the animals displayed. Visitors have attitudes concerning the environment, inherent fears of some animals, and distinct preferences of those types that they like and are attracted to view. Possession by the visitors of a pre-existing mind-set about the objects in exhibits affects their subsequent interpretation (Whittall 1992). Such attitudes act as a perceptual filter (Wittlin 1971; McManus 1989a) and create an emotional barrier in museums to the visitor's general observations both of the exhibits, and the number of attributes upon which they focus, and such a filter is likely to operate about animals as exhibits.

Moreover, children display a surprising lack of friendliness to the environment and to animals (Kellert & Westervelt 1982: 188), which is at odds with the conservation ethic featured and promoted by zoos at the present time. Together with education these two principles form their main mission and their interpretation is designed accordingly (Brisbin 1993; Brambell 1993; IUDZG and IUCN/SSC 1993). 'Education' is the title of Chapter 4 in the World Zoo Conservation Strategy (IUDZG 1993), and the first section opens with the declaration, 'in one way or another they (the visitors)have an interest in animals'. This interest could be the starting point in developing public understanding about biological conservation because visitors arrive at a zoo with both knowledge and attitudes about animals and associated issues.

The emotional appeal of animals is believed by many, e.g. Krakauer 1994, to be the most important factor in determining the reactions of visitors to animal exhibits, for nothing can 'match the emotional impact of seeing live animals' (Hotchkiss 1993). Zoo visitors in the USA showed strong affection for individual animals and were concerned about issues of animal welfare and rights (Kellert & Berry 1980: 53). Moreover, the preferences of children for animals alter as they grow up (Badarraco 1973) and appears to be gender related (Alonso 1994).

The ability of an exhibit to gain the attention of visitors so that they look at it is referred to as the 'attracting power', and the extent to which the visitors stay is its 'holding power'. Fear of an animal attracts visitors to look at certain types of animals as exhibits. This fear of particular animals is innate (Bennet-Levy and Marteau 1984), based on the perceived potential danger of the animal to the self, as well as the degree of discrepancy in the appearance of the animal with the human form (Gray 1971), and reaches a peak at four years of age (Seligman 1971). Preconceived opinions or feelings, such as the 'ugliness' of the animals, or danger from the animal to themselves, influence children's attitudes regarding animals (Bitgood, Benefield, Patterson and Nabors 1986; Eagles and Muffitt 1990; Bitgood 1992). The greatest holding and attracting powers in zoos are exerted by exhibits which show animal-animal action, human-animal actions, babies (Rosenfeld 1980: 73; Bitgood and Benefield 1986), or animals perceived to be beautiful yet also dangerous to humans (Bitgood, Benefield, Patterson and Nabors 1986; Bitgood and Thompson 1987). However, the literature does not reveal the extent to which these perceptions are applied by visitors to 'museum' animals.

The positive emotive appeal of animals is also powerful. Seeing 'pretty animals' was one of the reasons cited by people for visiting a zoo (Kellert 1980: 58). The popularity amongst zoo visitors of certain zoo animals, such as the Giant Panda, is due to anthropomorphic features that the animal possesses or familiarity with the animals (Morris 1961; Surinova 1971). Young children employ anthropomorphic terms in their explanations of both the form and behaviour of other animals (Carey 1985: 183). Thus it would not be unexpected that groups of children tender anthropomorphic interpretations of animals. However, Morris and Morris (1966: 172) postulate that the perception of an individual about their own role in relation to other people may influence the attitude which they express towards certain animals. Such feelings are especially pronounced in children, who respond in a characteristic manner which differs with their age. For example, Morris and Morris consider that the older child is 'Beginning to compete with its parents and at first does so by imitating them: *they* have been caring for it, therefore *it* will care for small animals. The pet becomes the infant substitute'. Furthermore, since children and adults do not share the same views about animals (Kellert and Westervelt 1982: 188), the content of conversations of children who view animals without an accompanying adult is likely to be different from that of children looking at an animal with adults who are more inclined to hold 'doministic'[1] and 'naturalistic'[2] attitudes towards the animals.

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[1] The attitude of wanting to dominate animals for human self interest.

[2] The attitude of keeping animals in natural surroundings etc. that resemble their non-captive habitats.

[3] A dislike of, and antagonistic attitude toward, animals.

[4] Holding attitudes about how animals can be utilised by humans

Aesthetic issues concerning the exhibition of animals, both alive and preserved, are other key factors which influence the attitudes of visitors about animals. Bostock (1993) debated the ethics of keeping animals in zoos, concluding that it is morally permissible and Finlay (1986) showed that perceptions about different types of enclosures in a zoo affect the reactions of the visitors to specific animal exhibits and whether they were acceptable. Emotional attitudes may impede the acquisition of scientific knowledge, for visiting zoos and learning about animals in school in the USA have little positive influence on children whose knowledge of animals was low and the children, zoo visitors and solely school taught, showed 'negativistic' attitudes towards animals (Kellert and Berry 1980: 42). However, although the occurrence of negativistic[3], doministic, and utilitarian [4] feelings towards animals decrease as children grow older, (Westervelt 1983), some of these feelings do persist amongst adults who are more inclined to 'doministic' and 'naturalistic' attitudes towards the animals (Kellert 1979;1979b;1980;1985). Thus, these specific feelings of negativity, the need to use and dominate animals, appear to be a function of development and not of external influences, such as a zoo visit, which merely provides an outlet through which children can express their feelings. Zoos, and museums could play a far greater role in the development of the knowledge of children of animals, rather than providing 'something' for the children to watch focus their educational efforts for children from six to ten years of age on the affective realm and emphasise emotional concern and sympathy for animals (Kellert 1985).

1. 6 NAMING ANIMALS

Rosenfeld (1980: 58) observed that if people do comment about live animals that are exhibited, they name the animals before referring to other attributes.

1.6.1 A conflict of interests

There are two different personal contexts in conflict at museums or zoos concerning the naming of animals, that of the zoologists in the institution and that of the non-specialist visitors. Unless the visitors have sufficient specialist knowledge of zoology, it is unlikely that the debate on appropriate taxonomic theory is relevant or meaningful to them.

The definitions of the terms used within this thesis to refer to the grouping of animals are defined in the following table:

Table 1.3

Definitions of terms referring to categories and groupings of animals.

Name of grouping	Definition
Category	This is a group of organisms possessing some identifiable attribute in common. In this thesis a category can be at any level of the zoological taxonomy, e.g. animal, cat, monkey, whose individual members share an attribute that is noticed by the visitors. Categorisation is the process through which an organism is allocated to a category. The term category may be used in constructing a taxonomy (see below) or applying a zoological one, for taxonomies contain a number of categories. People identify basic category term for animals and extend the classification of such items into a taxonomy using super ordinate or subordinate categories, e.g. the category 'cat' can be extended upwards into the category 'Meat eater' and downwards into the categories 'domestic cat' and 'wild cat'
Themed Groups	A number of individuals of different animal types grouped together for display purposes, the theme of which is decided by the zoo or museum, e.g. Animals of Africa; Animals of the rain forest; pets
Collections	The assemblage of a number of specimens of different species for display or research, e.g. the London Zoo animal collection, a collection of rare breeds, the research collection of the Natural History Museum
Taxonomies	The results of the classification of organisms into groups based on shared similarities of structure or origin, e.g. all members of the category mammals are classified as vertebrates because they possess a skull and a back bone. In turn all vertebrates are members of the superordinate taxonomic group. Chordates because they all posses a notochord and post-anal tail at some stage of their life history.

Zoos and museums that exhibit animals present several obstacles to the understanding of their visitors about them. One well recognised obstacle is the scientific naming system that the institutions provide. This system is at odds with the names used by the majority of their visitors (e.g. Rosenfeld 1980; Taylor 1986; Hensel 1987; Hage 1993). On the one hand, the institutions name the specimens at the lowest category in terms of zoological taxonomy, that of the species, and furthermore, provide the scientific name (which is in Latin), and the formal common name in the relevant language. The visitors, on the other hand, provide a vernacular name for the specimen and, unless the animal is a particularly well known specimen, e.g. Koala, do not identify the species, but recognise one of the superordinate group to which it belongs, such as 'bear' or 'bird'. We do know that naming everyday animals is an important activity for young children (Anglin 1971) but we do not know the level of zoological taxonomy to which the vernacular names, that children and their accompanying adults spontaneously apply to animal specimens within a naturalistic setting or within an animal collection, belong.

The following section will consider the main ways in which people categorise items and acquire the everyday or basic naming system, with particular reference to animals, and the nature of zoological taxonomy. Furthermore, we have to consider the nature of zoological taxonomy and whether learning and applying it *is* a similar process to categorisation of everyday objects. The nature of zoological taxonomy must be explained before the extent to which the conversations of visitors indicate their interest in biological topics and their use and understanding of zoological taxonomy and can be understood.

1. 6. 2 Zoological taxonomy and nomenclature

The ability to identify animals scientifically is of increased importance today with the concern about the reduction in global biodiversity and the need to identify those animals and plants under threat (Crisci, McInerney & McWethy, 1994: v-vi) but this skill and language of taxonomy is not possessed by most visitors.

Zoological nomenclature encapsulates taxonomy which is concerned with component properties of the different types of animal which are *natural categories (monophyletic groups)* or *kinds.* Members of a 'natural kind' share essential properties derived from a common ancestry with other members (Lakoff 1987: 161). Taxonomic judgements cannot be made without an understanding of the structure, physiology and behaviours of the organisms. Therefore, animal collections have a key role in teaching visitors, especially school children, for zoological taxonomy is part of the Science National Curriculum, to recognise and identify animals from morphological similarities and their associated features through perceptual attributes.

Zoological nomenclature, the system which allocates the scientific name to animals, is a system established by Carl Linnaeus in the late eighteenth century, although rooted in the work of a number of scientists from Aristotle onwards. Linnean nomenclature is a shorthand, providing a precis of the detail of the structural relationship of one animal to others. Each kind or species of animal has one name of two component parts. Hence, *Felis domesticus*, the domestic cat, has its specific name *domesticus* which cannot stand alone, and its generic name *Felis*. The species are grouped into superordinate categories of ascending order until the phylum and then animal kingdom categories are attained but the species name is the one used most often by biologists. Thus the name *Felis domesticus,* the scientific name of the domestic cat, conveys information about the type of animal, its relations and its structures and behaviour to a zoologist in a brief way. Its use requires a command of the relevant particular language and an understanding of hierarchies and transitivity. The data from this study will show the names used by the visitors and may indicate the basis on which such a name is allocated (section 4.1.3 and Table 4.4). Therefore it is important for this study that the way in which people do categorise everyday items is reviewed.

1.7 LEARNING TO CATEGORISE ANIMALS

There are two goals of categorisation. Categorisation seeks to maximise the similarity between category members, simultaneously minimising similarities with members of other categories. Categories occur in levels of relationship and this membership of super ordinate categories by members of distinct subordinate categories, forms the basis of taxonomic hierarchies, one of which is in the classification of animals.

1.7.1 Recognising categories

A large proportion of the conversations of children and their accompanying adults in animal collections are concerned with allocating names to individual animal specimens (Rosenfeld 1980; Taylor 1986: Hensel 1987; Hage 1993). However, Donaldson (1978: 92) points out that a request from a young child for the name of an object, or for an explanation, is part of a child's acquisition of the *dimensions* of the object, not necessarily an overt need for categorisation. Michael's recognition of the animals which he identified as birds, in segment 4, is an example of this phenomenon, which is a precursor of categorisation.

Children need to know the names of parts of animals so that they may abstract out the criterial attributes or recognise the cues of category membership. This is a transitivity problem, the parts form the whole, and Tverksy (1989) showed that children are more likely to group objects taxonomically when they share parts than when they do not.

CHAPTER 4

CONVERSATIONS AT MOVING ANIMAL SPECIMENS

Farm and zoo animals and animated models all share movement as a characteristic, therefore the overall data related to conversations about such specimens are considered within this chapter. Additional aspects of the data concerned with the social composition of the school groups and the age of the children are considered in Chapters 7 and 8 respectively. Except for the farm animals, the animal specimens are part of exhibits which are designed with a message in mind for visitors. The data discussed in this chapter were collected separately from school and family groups visiting London Zoo (live animal exhibits), animated dinosaur models exhibited in a new exhibit at the Natural History Museum, London, and school groups visiting non-exhibit farm animals on a working farm. The complete data can be found in Appendix 2.2. The contents of the Prologue conversations provide a model with which the data collected from other groups can be compared, and which can serve as an exemplar for a number of issues common to all the data. Thus, the Michael data serve as the starting point in unravelling the story that the content of the conversations can provide. However, the Prologue data are not combined with that of other groups because they were collected as a record of a complete visit and is a longitudinal study. Conversely, the other data were sampled an unknown stages of the visits.

The content of the conversations at animal specimens that move will be discussed in three broad areas:

- that of conversations generated at live animal exhibits where visitors expected the animals to move. These data were collected in the zoo from families, school groups, and Michael's family;
- that of school groups watching live animals which were not exhibited per se but kept on a working farm where they could be viewed;
- that of families and school groups observing animatronic models of dinosaurs which are constructed, moving models of unfamiliar animals.

This chapter considers whether the conversations of visitors at animal specimens that move in some manner have a similar content. The moving parts provide visual clues that may lead visitors to consider that the models are living animals because children use movement as the main criterion for judging if an object is a live animal. The second criterion used by children is the emission of sound. The animal specimens, including the dinosaur models in the diorama, possess the two salient features often identified by children as possessed by living animals; movement and noise (see Chapter 1). The exception is the exhibit at the exit of the dinosaur gallery where the lizard-like model is only programmed to move.

The specimens in the zoo and the museum are exhibits, staged in a theatre-like setting for people to look at (Andersen 1987). They are arranged to convey, through the design of the setting, a message to the audience, the visitors, who may or may receive it. The farm animals, on the other hand, whilst they are available to be observed, and may carry an inherent message because of their characteristics, are not provided by the farm managers to 'tell a story'. The visitors' presence is incidental to the work of the farm, which is not to teach visitors about animals in the way that the zoo or museum set out to do. To separate out effects of 'looking at animals' from 'looking at exhibits,' it is useful to compare the data from exhibits with that from a farm.

4.1 THE OVERALL PATTERN OF TOPICS OF CONVERSATIONS AT LIVE ANIMALS

4.1.1 Patterns of comments

The main categories into which the contents of the conversations have been allocated within the tool of analysis, the systemic network, are discussed in Chapter 3. Essentially visitors had to locate something within an exhibit about which they could converse and often employed ostensive language to draw the attention of other members of their group to an animal or other aspect of an exhibit. Comments that engineered such a focus of a dialogue were allocated to the category, 'exhibit access' and those about the exhibits are referred to as 'exhibit focused'. Within this overall category visitors may have commented on aspects of the animals, i.e. 'animal focused' comments. In contrast, those referring to items in the exhibit other than the specimens were categorised as 'other exhibit' comments.

It is important to remember that the function of the conversation is reflected in the content. Those comments associated with social intercourse and the organisation of the group were referred to as 'social and management' categories and treated as one super-ordinate category in the majority of reports of analyses of content. The interpersonal aspect of conversations is not the focus of the study, the aim of which is to establish which attributes of animals visitors commented on. Visitors remarked about the exhibits and animals and responded to them, not only by observations, but by interpretations from their own experiences and affective responses. Such comments personalised the conversations for the visitors, they 'tell the story or narrative'.

The data are a record of the occurrence of a category within a conversation at least once and are not an indication of the overall frequency of comments within a conversational exchange.

Essentially, as Table 4.1 shows, Michael's family talked about the exhibits when they were in front of them. They composed interpretative comments at each exhibit and their observations were predominantly about naming the animal. Of lesser importance was reference to the behaviour they observed and body parts, which was the attribute category mentioned the least often. Comments about the environment, natural habitat or conservation issues, were minimal. More detail of the categorisation is given in Appendix 2b, Table 1.

The analysis of the content of the conversations of Michael's family (Table 4.1) shows a high 'exhibit access' value (80%). All but one of the group were unfamiliar with London Zoo, its geography and its exhibits, and such unfamiliarity *may* account for over three quarters of the conversations containing words such as, 'Look!', 'Where is it?', 'There!', as the family found the animals and shared their information. Examples occurred in segment 10 of the Prologue , 'Look at that one!', or segment 11, 'There he is!' and in segment 60, Michael gave a definitive, 'That's a Golden Lion Tamarin'. In segment 7 he drew in his brother to finding out what animal there was to observe within an exhibit, 'Hey Neil, what's over there? Look there's some lions'.

Table 4.1

Summary of content of the Prologue conversations

Category	Number n= 70	Percentage
Exhibit focused	70	100
Management/Social	58	83
Exhibit access	56	80
Other exhibit comments, e.g. labels or furniture	41	59
Animal focused	70	100
Body parts	32	46
Behaviour	51	73
Naming	69	99
Affective comments	14	20
Interpretative comments	70	100
Environmental comments	2	3

Table 4.1 shows that the occurrence of 'exhibit access' references at least once in a high number of conversations. This phenomenon may indicate that the exhibits did not clearly facilitate observation of the animal specimens. It would be expected that the rate for 'exhibit access' would be lower in the museum where the animal specimens are clearly displayed in the position and pose that the designers have placed them.

Other exhibit comments referred to some aspect of the exhibit, such as 'furniture' or the label, that caught the attention of visitors. These occurred at least once in over half (59%) of the conversations in the Prologue. Half of these 'other exhibit' comments generated by Michael's family were about the setting and, of these, 17% (7 conversations) referred to the label at least once, whereas 66% of the 'other exhibit' comments referred to items within the exhibit such as exhibit furniture. Over three quarters of the exhibit furniture comments were generated in conversations that referred to the position of the animal within the exhibit, although 43% of conversations units which referred to position comments did not refer to exhibit furniture. Examples of exhibit focused comments occur in segment 30 where Michael pointed out the location of a snake, 'Yes, he is at the back there, on the rocks', and in segment 11, where Grandma commented about the heat lamps and subsequently noticed a large plant in the exhibit. These results indicate that exhibit furniture *is* an important feature and is used as a reference point in informing other group members about the whereabouts of the animal.

The conversations of Michael's family day out at the zoo had a high social or management value. Conversations were used to teach cultural norms and to control behaviour. For example, Grandma reprimanded Michael in segment 12. 'Get your feet off please, you're not meant to be on there!'. Conversations were used by visitors to acknowledge each other and to explore and develop social memories, as Grandma and the Aunt did in segment 67.

The most frequent specific topic within the Michael transcript was that of naming each animal in some way. Furthermore, in 27% of the conversations a member of the group asked about the identify of the animal at least once. It is interesting that Dierking (1987) found that questioning was the dominant behaviour within family groups and was often used by the adult to lead the child into a dialogue. Michael's family allocated identities to specimens which they recognised, using everyday names like 'birds', 'jellyfish', which are at class level in zoological terms, or 'tiger' which is a genus level term. Such identities or names were used in just under two thirds of conversations (63%). The various contents of each conversation are not restricted to being coded within only one category. A naming comment may contain the first used name, the basic term according to Anglin (1970) and Cameron (1994), and may also be coded according to its zoological taxonomic category. For example, the popular name (terminal 55 of the network) with which the animal was identified first of all, the basic term, e.g. 'fish', would be coded again into terminal 58, the class/phylum category, because 'fish' is the class of chordates to which the specimen belongs and the everyday version of the class name had been used in the conversation.

There are two aspects to the names that visitors used. Firstly, the allocation of a familiar everyday or 'labelling' name; and secondly the use of the common name, either known to the visitors as part of their personal knowledge or gleaned from the written labels, either through covert reference, called text echoing (McManus 1987: 327), or by overt reference, alluding to names by association. An animal was either given a basic name (labelling), as in segment 1 of the Prologue, 'There's a monkey, monkey', or categorised into the appropriate class/phylum or order/family, for example, in segment 35, 'A fish'. In both these examples the basic name also allocates the animal to a zoological category, 'family' in segment 1 and 'class' in segment 35 respectively. Just under a half of the names used were of the family/order level which is used as a basic name in a similar manner to that noted by Berlin (1978). For example, in segment 7 Michael said 'Mum, it's a woodpecker', using the family name to categorise the animal, and, in segment 38 he asked if the fish at which he was looking were piranhas. The common name was used on a few occasions (14% of all conversations), for example, 'Red Crowned Crane' was used in segment 2 and 'Indian cobra' in segment 31 by Grandmother who was text-echoing from the label.

Michael's family group drew on their personal knowledge of the form of animals to interpret their observations. Specimens were compared with another type of animal, including the self, in 20% of the conversations. However, only 4% compared animals with humans and only 16% of the conversations included a comment that interpreted the animal in human terms, e.g. Prologue segments 19 and 11. Only two of the conversations about primates compared the animal with the human form (segments 1 and 33). This is a surprisingly low occurrence as Carey (1985:184) found that children have a propensity for explaining other animals in human terms. Alternatively visitors used their own specialist knowledge, as the Aunt did in segment 7, where she identified the lion correctly as, 'Asian lion'.

Once animals are named, the visitors commented about the obvious behaviours or body parts of the specimen. Behaviour was referred to in 73% of all the conversations focused on animals, and almost half (45%) of these references to behaviour contained a mention of at least one body part. The most frequently discussed behaviour was the location of the animal, its movement, feeding related actions and other behavioural patterns, particularly camouflage. Excretory and sexual behaviour, parental care and animal interactions were mentioned when they caught the attention of the visitors. Examples occurred in segment 62, when Grandma said, 'Oh, he's going to do a wee!' and in segment 60, where Michael commented that the Golden Lion Tamarin was urinating. His observation effectively stopped the teaching dialogue that the Aunt was establishing about the taxonomy of these endangered animals.

A comment about body parts occurred in almost half of all the conversations which contained references to the animals. 'Dimensions' was the largest category (29%), followed by comments about the front end of the animals (13%). The composition of these superordinate categories of the content of the conversations are defined in the networks shown in Chapter 3. The initial observational comments of the visitors about the anatomy and behaviours of the animals were generated from their observations of actions, both the structures and behaviour, of the animal. The importance of the overall dimensions of animals in the content of the conversations is not surprising because the size, shape and colour are the more striking observable features. Michael's family constructed a narrative about the scene that they viewed, expressed attitudes about the animals and explained what they observed in terms which *they*, not the zoo, understood.

The pattern of comments (Table 4.1) can be grouped into those related to the site, e.g. exhibit access comments; the rationale for the visit i.e. family leisure visits where fewer knowledge source and animal focused comments, but more social comments, would be expected to be heard; those which are direct observations about the animals; those which use narrative or interpretative comments used by visitors to interpret the exhibits in their own terms; and those about other aspects of the exhibit. Animal exhibits, are, according to the classification of exhibits proposed in Table 2.2, dynamic, but largely of the passive type, although they do present opportunities for interaction.

However, it is apparent from reading the transcripts that the wish for other forms of interaction was voiced often and opportunities for such activities were grasped when possible. Michael for example, in Prologue segment 7, remarked that, 'The tiger has just winked at Neil!'. His mother remarked, in Prologue segment 9, about the interaction she has had with the total exhibit when she commented on the smell at the penguin pool. Visitors 'label' animals, as Michael did in segment 33 where he said, 'Monkeys!', and then frequently commented on other attributes. The more senses that *may be stimulated* by the exhibit, the more the visitors *can* interact.

4. 1.2 The basic concept of 'animal'

The conversations of Michael and his family contained a number of conversations with at least one reference to particular topics and these topics can be matched with those identified as the main categories of conversations that were identified and named by Hensel (1987: 113-114) in her study. Hensel's study, 211 conversations, is compared with the 70 units of conversation in Michael's visit (Table 4.1) in Table 4.2. The definition of the category and number of comments reported in Hensel's study appear in brackets.

Table 4. 2

Topics of conversations of family groups in an aquarium in USA compared with the occurrence of comments on similar topics within the 'Michael' data

Category	Hensel n = 211	Prologue n = 70
Naming	44 (63%)	69 (99%)
Body parts	75 (36%)	32 (46%)
dimensions	97 (46%)	20 (29%)
Behaviour	33 (16%)	51 (73%)
movement	23 (11%)	21 (30%)
food related	9 (4%)	10 (14%)
Geographical range	4 (6%)	2 (3 % habitat)
Interpretative		
anthropomorphic	10 (5%)	11 (14%)
Affective comments	34 (49%)	14 (20%)

The two sets of data in Table 4.2 share similarities and this indicates the predominant foci of conversational topics of family visitors when they look at animal specimens. Differences in the data are explained by the type of animal being viewed. Hensel's data was collected at fish whereas the Prologue was collected at a range of animals of which number were primates whose behaviour was commented upon and the zoo animals were known, by everyday names at least, by the visitors whereas the individual types of fish were less familiar. Hensel commented that the topics of conversations that she collected were similar to those of the questions collected by Taylor (1986) during his work in another aquarium. Such similarity in the categories of conversations suggests that these are the common topics expressed in aquaria and at other types of animal exhibit. Family visitors comment about similar topics related to animals. Animals are named; their behaviour, particularly locomotion and feeding, is commented upon; their dimensions noted; the size of the animal is judged and the colour and type of body covering identified. Sometimes some other 'unfamiliar' but salient attribute catches the attention of the visitors and upon which they comment.

4. 1.3 Naming the animals

Examples of conversations from the Prologue can be used to illustrate the way in which visitors name animals. Michael's family identified and categorised animals using their own experience. If that failed them, individuals turned to another member of the group:

54. Tarantula

Michael:	What's this one, Aunt Susan?

On occasions, the personal information supplied by a member was amplified by another referring to the label:

56. Bird Eating Spider

Michael:	I wonder what's in there?
Mum:	It's a huge big spider.
Aunt:	It's a bird eating spider the label says.

Infrequently one visitor told another a criterial attribute, as occurred in the following exchange:

33. Chimpanzees

Michael:	Monkeys!
Aunt:	No! They are chimpanzees. They haven't got tails. They are our nearest relatives.

In a few instances one individual, in a 'talking to teach' mode, asked someone to justify their categorisation or identification, as the Aunt, a teacher, did in the following exchange:

Aunt:	But how do you know it's not a shark?
Michael:	Because it's flat.

In the study of school children the number of conversations that referred at least once to names used for animals within the zoo was similar to that found amongst the conversations of families, 87% and 88% respectively (Table 4.8 and Appendix 2.2 Tables 2 and 5). Such a similarity within the data indicates that all the visitors were using a name of some sort, an effective everyday containing their basic terms for the animal (Anglin 1971; Cameron 1994), but not necessarily the same name or even the same naming system. Furthermore, the terms used were not all at the genus level, as would have been expected from Berlin (1978) and casting doubt on the generalisability of his findings.

Table 4.3

The name terms used in the Prologue grouped according to their zoological taxonomic group

Class	order	family	genus	species
birds		monkeys	crane	Red Crowned Crane
		New World Monkeys	rhinoceros	
worm	grubs **	lizards	tiger	
		flies	lions	Asian lion
		snakes	penguins	
			woodpecker	Giant Woodpecker
	seals		Mynah bird	
	beetles		viper	Lord Derby's Zonure
			skunk	Blue Tongued Skink
			chipmunk	Indian cobra
		monkeys	chimpanzees	
			eels	
Fish			pike	
Sea anemones	echidna		catfish	
Starfish	bats		batfish	
Coral*	grasshoppers	cat	cobra	Splotched Genet
spiders	crickets	locusts	plaice	Golden Lion Tamarin
Millipedes	stick insects	tarantulas	piranhas	Bird Eating Spider
Sea urchins	cockroaches	hermit crabs	giraffe	
Jellyfish			zebra	
10	8	10	20	9
Total 57 names				

*(sub class) ** (identity category of a stage in a life history (Bruner et al. 1956:2))

The names used by Michael and his family, and the zoological categories to which these names refer, are shown in Table 4.3. The genus term, e.g. rhinoceros, cobra, giraffe, is the largest single taxonomic category into which the name used by the family members can be allocated, other categories were also employed. The visitors used family names, such as ‘monkey’, and the class terms, ‘bird’, ‘fish’ and ‘insect’, as basic terms for those particular groups.

Although visitors did not use the scientific genus name, and rarely used the common name, they used an everyday name in English that is at the genus level in terms of hierarchical taxonomy. If the genus level name were not used, the name employed was not necessarily, in zoological terms, the next superordinate name to the genus name, e.g. bird is *not* the next superordinate taxonomic term for the Batuleur Eagles. Michael failed to specifically identify these birds and referred to them by the basic term ‘birds’, the basic vernacular term used for this type of specimen by non-zoologists who can not provide a definitive name.

5. Batuleur Eagles

Michael: There’s some birds.

Smith and Medin (1983:109) showed that people in the USA recollected ‘bird’ as the group to which a robin (genus level term) belonged far more quickly from the choices proffered than they recollected ‘animal’, the next superordinate terms which they could have chosen. Such psychological research occurred within a laboratory and presented alternative names for the animal at different hierarchical taxonomic levels from which the subject could choose. In animal collections, unless the label is read first, the name for the animal is *recalled* by the visitor from their memory, not chosen from a proffered selection of alternative terms and the name recalled is most often the basic name. When the name is read from the label the one used by the visitors is usually a common name, a subordinate category in terms of naming hierarchies used by visitors.

The allocation of a name, or label, to a concept is the last stage in concept acquisition (Nelson 1983: Bruner, Olver and Greenfield 1966:5). Children can not communicate their ideas to others unless they can refer to the items about which they want to talk, the label for the object is essential before they can acquire further concepts related to the object and the zoo or museum are very much places where ‘labels’ for animals are acquired, even if little further language and cognitive development related to animals occur during the visit

Young children only use one name for any object and, as Michael showed in segment 54 and 36, fail to recognise the transitivity of class inclusion (Inhelder and Piaget 1964; Markman 1989: 154-159). The term 'fish' is the superordinate category embracing 'shark' and 'spider' subsumes animals that are tarantulas. Michael also exhibited, in segment 37, the use of the principle of themes and collections, if animals are exhibited together and look physically similar, they must be in the same group. Michael also showed that he *was* capable of abstract thought, holding one image in his mind whilst comparing it with an concrete object, as he did in segment 43, the beginning of Piagetian concrete operations (Piaget and Inhelder 1969:96) and a precursor for learning true hierarchical taxonomy.

4.1.4 Using criterial attributes

The data shown in Table 4.2 above was obtained from two different sets of family data, albeit one of one family and the other from another country and from a number of different groups, but from families looking at live animal exhibits, shared a pattern of topics about which they commented. Particular mention was made of the dimensions of the animal; its shape, size and colour and body covering; its head and sense organs; locomotory appendages. Feeding, location and movement are behaviours which are part of everyday concepts, but biological functions, such as breathing, excretion, reproduction and irritability were mentioned infrequently and only when the visitors observed the relevant behaviour in action. The similarity in categories mentioned in Table 4.2 suggest that there is a set of attributes about which visitors at animal specimens comment.

In the zoo, or museum, the visitors retrieved names stored in their memories, and this process may have been triggered when they looked at the animal. It is unlikely that visitors employ classical categorisation theory when they allocate unknown animals to a category because, in order to do so, the categoriser needs to know both the category description and the criterial attributes that are needed for an object to belong. Visitors may or may not know the specification for membership of the categories of animals at which they are looking and the criterial attributes requisite for that membership. If they know any attributes of either category or attributes the specifications are likely to be everyday terms, rather than scientific criteria and names, and the criteria much simplified in terms of the number of defining attributes from those used by zoologists. Such a classical categorisation approach was rarely heard within the data of this thesis, although a few school children did use a simple version. Year 1 children, visiting Whipsnade, were heard to be categorising an individual animal (a monitor lizard) on an 'all or nothing' system. Their class teacher was a zoology graduate. The conversation was as follows:

Boy 1: What's that?
Boy 2: It's a reptile, it's got a dry scaly skin.

Another group of year 2 children walked through the Discovery Centre at Whipsnade with their teacher. The teacher was trying to focus the attention of the children on criterial features of the animals. The following exchange occurred at the Burmese Python.

Girl: Miss, there's one in the bath. It's having a rest in the water!
Teacher: That's right, it's having a rest in the water.
Girl: It's a reptile.
Teacher: How do you know it is a reptile?
Girl: Its skin.
Teacher: Well, have a closer look, has it got hairs?
Boy: Look closely.
Teacher: That's right! They're scales, you weren't here yesterday when we were talking about it.

Later the same teacher asked her group who were standing in front of the Toucan, What kind of creature is that?', 'A bird', replied a boy. 'How do we know that?' countered the teacher. 'Because it's got feathers and a beak', replied the boy. 'That's right!', concluded the teacher.

Year 2 children in the Creepy Crawlies exhibition in the Natural History Museum used worksheets prepared by their school to identify specimens. 'Eight' announced a boy looking at a spider and comparing it with his drawing. Two year 2 boys conducted the following conversation referring to their worksheet.

Boy: Look at the Bumble Bee, a Bumble Bee has 6 legs.
Boy 2: A spider has 8!
Boy 1: Now we want a beetle.
Boy 2: Slug's got none.
Boy 1: A beetle has 6 hasn't it?
Boy 2: Now I have to draw a picture.

Visitors either worked out, from features that they perceived, what a likely appropriate identity was, or they used an exemplar.

The Prologue transcript illustrates a point that is reinforced by exchanges from other transcripts collected within the zoo. An everyday naming system for animals was used in place of the zoological nomenclature by the visitors. Visitors did not employ zoological taxonomy, but referred to an animal as a member of a collection or group and they rarely commented upon attributes that are used by zoologists in allocating specimens to taxonomic categories. However, if children are being taught science as part of the rationale for their school visit, science talk and zoological terminology would have been expected to have been heard, to a greater extent than they were, even if the children are not developed sufficiently to be using zoological taxonomic hierarchies (Inhelder and Piaget 1964: 40).The only sites where such reference to criterial attributes was heard was amongst some school groups at Whipsnade, whose teacher was a zoology graduate, and in London Zoo generated by Michael's family, e.g. Prologue segment 29.

If the identity of an animal was unknown, the visitors allocated the name of a similar category. In the following example a man and his son were looking at the Arabian Oryx on a summer's Sunday afternoon at London Zoo. 'That's a goat', announced the father, and the group moved on. Michael looked at an unfamiliar animal, the Okapi, and extracted the salient features that he recognised from other familiar animals, namely the stripes of a zebra and the horns of a giraffe, and said, in segment 47, 'Look! That's half giraffe and half zebra!' The examples cited reflect a trend within all the data that the visitors were interpreting and naming the animal specimens from their own knowledge: they rarely referred to the interpretation provided by the zoo *if* their own repertoire of knowledge about different kinds of animals would suffice. Moreover, the naming system employed was non-scientific and vernacular. Whilst the visitors were looking at the animals they were apparently acquiring little scientific knowledge. Did this matter? The answer is that surely this result must be of concern to the zoos whose mission is essentially one to develop the public understanding of science.

4.1.5 Using the message from the institution

Michael's family referred in a few conversations directly to labels provided by the zoo, e.g. Prologue segments 12, 22, and 26 and indirectly in other segments when the visitor 'text echoed', e.g. 2 and 9. The family used the labels in four ways. Firstly, as an immediate advanced organiser to find out what type of animal is on display: such information helps with exhibit access and with assisting a companion in finding the animal. In segment 30, at a snake exhibit, the Aunt asked Michael, 'Can you see this one?', and he replied he could, describing the animal's position. Secondly, labels are used to supplement personal knowledge of a visitor, so that they can obtain a name for an animal unknown to them or that they could not label satisfactorily after looking at the exhibit. The names used for the animals were not overtly gleaned from the provided labels, which were directly referred to in only 6 conversations, reported in the Prologue (segments 2, 12, 22, 26, 53 and 56), five of which used information gleaned from the exhibit label to provide the animal with a basic name term such as 'cat'. Thirdly, labels are used to provide reassurance about the correct identity of specimens. For example, in segment 12, Michael recognised the animal as the one whose image is portrayed on the label, from where he obviously obtained the common name, 'Giant Woodpecker'. Lastly, labels are used so that visitors can obtain additional information from that which has been chosen and provided by the institution. Michael's family rarely referred to the label in the initial utterance but during their subsequent exchanges.

Furthermore, the family, like other zoo visitors, rarely used the labels overtly, but referred to them covertly, either to find an appropriate name or 'label' for the animal, or for other information used in conversation. Such covert usage, or text-echoing, was evident to the researcher through noting the words incorporated within the dialogue of the visitors and comparing this content with that of the labels. For example, in segment 22 the Aunt announced 'Lord Derby's Zonure', a name which she read directly from the label, but did not say so. However, whilst the majority of the exhibits at which Michael's family looked were of single species, labels are probably of increased importance in the identification process in mixed species exhibits which resemble to a certain extent mixed object exhibits which visitors find more difficult to understand (Peart and Kool 1988).

The low occurrence of direct references within the conversation to labels, 10% of the Prologue, 12% for the school groups at London Zoo and 10% for the families at London (Appendix 2b Tables 2 and 5), from all conversations must disappoint zoos, especially if both the time and money that is allocated to the labels and their perceived importance for purveying the message of the institution is considered (Dana 1927; Weiner 1963). However, the family could identify to their satisfaction the animals they observed, and interpretations of the exhibits were obtained through the conversational input of the visitors themselves, not through the labels and other interpretative means provided by the zoo, contradicting the belief of museum workers, that the label is essential to tell the story of the object (Greenglass 1986; Pearce 1992). Perhaps the zoo is not telling the story of the animals but the visitors tell their own story using the zoo's animals. The Michael transcript also shows that visitors to animal exhibits *can* interpret the specimens and construct their own commentary and this observation reinforces those of other researchers in zoos, such as Bitgood and Patterson (1992), who point out that zoo visitors use labels little, and of Serrell (1988), who noted that visitors refer to labels *after* they have looked at the animals. Such observations reinforce the opinion of museum workers that a label is essential in order to tell the museum's story. However, the visitors would have to *want* to read the label, and then do so, to access the zoo's story.

It is disappointing, however, that very little of the wealth of information provided by the zoo is referred to by the visitors. London Zoo had many references to conservation work and the endangered status of the species that they were exhibiting, but this information is hardly used. The Aunt, who had previously worked at the zoo, provided one of the two references to conservation or endangered status in segment 7 and Michael commented about the 'rare' spider in segment 50, presumably referring to some information he acquired from a label. The data which were obtained from the other locations, and which are included in Appendix 2b, show that a similar pattern of infrequent or no reference to conservation exists across a wide range of sites. The reception of the message of the institution by the visitors is considered further in Chapter 10.

4.1.5 Patterns of behaviour of visitors

The 'Michael' transcript shows both how the behaviour of the group changes and how other needs of the visitors became more and more important as the visit progressed (Falk 1991). It also shows how there were definite stages within an encounter at the exhibit (Hensel 1987: 136 to 199). In segment 69 Michael, towards the end of the visit, asked about his lunch, and a level of frivolity, not heard before within this transcript, occurred in segment 70. This comment was made as the family walked to the snack bar, when the visit to look at animals was effectively over.

Dierking (1987) shows that the pattern of questioning employed by families changes as the museum visit progresses, reflecting the phases of a visit. This appears to have been the case in the Michael visit. The number of opening utterances generated as questions in exchanges throughout the visit are compared with those utterances that also began an exchange, but were statements (Table 4.4).

Table 4.4
The phase of the visit and first utterance of each exchange

INTENSIVE LOOKING PHASE		EXHIBIT CRUISING PHASE		LEAVE TAKING PHASE	
Beginning conversations		Middle conversations		Final conversations at animals	
segments 1-31		segments 32-59		segments 60-70	
Statements	Questions	Statements	Questions	Statements	Questions
24	7	12	16	7	4
34% total	10% total	17% total	23% total	10% total	6% total
n = 70	n = 70	n = 70	n = 70	n = 70	n = 70

The three phases of the visit, orientation, intensive looking and exhibit cruising, correspond to the second to fourth stages of a visit identified by Falk and shown in Chapter 1, Table 1. 2. The group went through their orientation phase just within the gates and before the recording of the conversations was started. The intensive looking phase occurred whilst looking at exhibits on the way to the Bird House, in the Bird House and in the Reptile House (segments 1-31); the exhibit cruising stage, looking at exhibits 'because they were there', was segments 32-59 and the leave-taking phase was segments 60-70 when lunch was in the minds of the adults, and ultimately of Michael.

The visit began with conversations starting with statements, moved to predominantly questions in the middle of the visit and ended with more statements, as the group started thinking about and searching for food, and left the animal exhibits. There is little evidence from the Michael transcript that these visitors engaged in other than a 'show and tell' dialogue with the institution (McManus 1987: 276), and, occasionally accepted relevant pieces of information from that provided in the zoo.

4. 2 OTHER FAMILY VISITORS TO LONDON ZOO

Numerous types of families have always existed but museum programmers have usually identified the family in a conservative manner as consisting of mother, father, and two to three children, although there has been acknowledgement that the intact family is not the only type that museums can and should serve (Hood 1989). Michael's family is an example of a non-nuclear family, it was a blended family, with two separate families brought together through the second marriage of the Grandmother. The content of conversations obtained from analysis of transcripts of conversations collected from other families is considered in this section. It is compared with the Michael data to establish whether a similar content of conversations was found when one or a few exchanges were collected from families at an unknown stage in their visit as was obtained from analysis of the complete transcript of a visit. There is no information about the composition of the other families to whose conversations I listened.

One way of examining the difference is to look at the data from two samples (Table 4.6) and compare the values for each category of conversation from the two samples, the Michael data and 'other families', in a contingency table (Table 4.5). The data tables (Appendix 2) provide lists of results but do not indicate any correlation between the separate categories of conversational topics that are used in the systemic network.

Chi-square analysis (χ^2)were carried out to establish if there were any association between specified content categories. The data sets used were similar in that:

1. the same sites and types of exhibit for similar groups e.g. Michael's family and other families at the zoo (Table 4.7);
2. the same site and type of specimens between different groups of schools and families (Tables 4.7, 4.8 and 4.9), school and family data at London zoo;
3. similar groups at different specimens e.g. data from school groups at animatronics, zoo and museum animals and farm animals (Table 4.10 and 11); zoo animals and preserved specimens (Tables 5.4, 5.5 and 5.6); zoo and animated models (Tables 4.12 & 13; animated models and farm animals (Tables 4.16 and 17); data from family groups in a similar sequence of comparisons except there was no farm data

available, (e.g. Tables 4.15 and 16) zoo and animated models; Figure 6.2; Tables 4.6 and 4.7 zoo and museum animals ;

4. comparisons of data were also made between different constituent groups i.e. the two age groups of school parties or social composition of school groups, pupils-only; chaperones and children, teacher and children groups, i.e. school and family groups at the same type of exhibit, except for the farm animals for which no data were available, e.g. zoo animals (Tables 7.1 and 7.2); attitudes to zoo animals according to social groups (Tables 7.9 and 7.10);
5. comparisons were made between the same category i.e. age groups at different types of exhibit, e.g. Tables 8.1 and 8.2.

An example of the $\chi_1{}^2$ used in analysing data is shown in Table 4.5. The data are taken from Table 4.7.

Table 4.5

2 x 2 Contingency table comparing the number of conversations about body parts from the 'Michael data' and other family data from London Zoo

	Michael	Families	
With comments about body parts	32	75	107
Without comments about body parts	38	68	106
Total comments made at exhibit	70	143	213

The χ^2 value is 0.85 which is not significant at 1df. This will be written as $\chi_1{}^2$ in tables

Table 4.6 shows that a comparison of the data for the categories that are mentioned at least once within the conversations were not significantly different except for the category of use or reference to knowledge sources. Michael's family named the animal in all but once instance of a conversation at an animal exhibit. London families referred to knowledge sources significantly more than did the Michael Group. Michael's family were more familiar with zoological nomenclature than most groups, the Aunt and Uncle were brought up by a zoologist and the Aunt possessed a zoology degree. The group definitely named the animals, such action was scored in 'naming' and not in knowledge source where the criterion was 'I think it is' or 'I know...' or 'It is...', all forms coded as knowledge source. Other groups were more timorous in their naming, hence the discrepancy between the two sets of data.

Table 4.6

Comparison of content of conversations (topic mentioned at least once) between Michael's family and other families at London Zoo

Category	'Michael' data * n = 70		Families * n = 143		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	58	83	122	85	0.23		
Exhibit access	56	80	123	86	1.27		
Other exhibit	41	59	62	43	4.36		
Body parts	32	46	75	53	0.85		
Behaviour	51	73	95	66	0.90		
Naming	69	99	126	88	N/A***		
Affective attitudes	14	20	29	20	0.00		
emotive**	6	9	10	7	N/A		
Interpretative	70	100	142	100	N/A		
knowledge source	19	27	82	57	17.19	$p<0.005$	0.08
Environment	2	3	9	6	N/A		

* 'n' will be used throughout this thesis to represent the number of conversational exchanges in a particular set of data. '** The name of a subordinate category is indented in this and subsequent tables. *** Not applicable (N/A), the χ^2 value for some of the categories of data could not be calculated because 'For 2 x 2 tables, the expected values in each cell should be 10 or more' (Erickson and Nosanchuk 1977:255).

The data are taken from the 'Michael' results and those for other family visitors in London Zoo (Appendix 2, Tables 1 & 5). Chi-square analysis was used in the study to assess the degree of association between categories of data. The χ^2 for the 'behaviour' category in Table 4.6 is 0.899 (0.90 to 2 decimal places). This is not statistically significant. 'By statistically significant, we mean that the observed phenomenon represents a significant departure from what might be expected by chance alone.' (Popham and Serotnick 1973:7). If the chance of the relationship occurring is 1 in 20, it is significant at 0.05 and a 1 in 50 chance at 0.025 whilst a 1 in 100 chance has a probability of 0.01 and 1 in 200, or 5 in 1000, of < 0.005. In this thesis the data will be discussed as significant when there is a probability value of either $p < 0.01$ or $p <$

0.005 and higher values of above 30 which have a greater probability value will be indicated by <<.

Table 4.5 contains one contingency table, that for knowledge source, whose χ^2 is significant at the < 0.005 level (17.19). The table also shows a Phi^2 value of 0.08. The value of Phi^2 remains constant, even if the sample size is increased one hundred fold. If the values for the knowledge source categories and the total sample sizes in Table 4.6 are increased by one hundred, the χ^2 value becomes 171.90, which is also significant at the < 0.005 level and above. The sample sizes for a number of sets of data collected for this thesis are fairly large and yield high χ^2 but low degrees of association. In Tables 7.3 (category management/social comments for children only, chaperones and teachers at farm animals), the χ^2 is 127.99 and the Phi^2 value 0.52 This is the highest value of Phi^2 found within the data. Two relatively high χ^2 values of 68.03 in Table 7.6 (compare animals) and 68.92 n Table 5.5 (behaviour category) produce different values for Phi^2, 0.17 and 0.08 respectively. Although both χ^2 values have a probability of less than 5/1000, the category from Table 7.6 has a higher association between values, irrespective of the sample size.

The χ^2 value for some of the categories of data could not be calculated because 'For 2 x 2 tables, the expected values in each cell should be 10 or more' (Erickson and Nosanchuk 1977:255). Therefore the χ^2 value is not given for results that fall into this category of below minimum number expected values. When the contingency table is larger than 2 x 2, such as the 3 x 2 tables that are constructed in Chapter 7, the mean of the expected values should be 6 or more for tests at the 5% (1 in 20) level and the minimum mean expected value should be somewhat higher at tests at more demanding levels such as 1% (Erickson and Nosanchuk 1977: 255).

Several assumptions are made about learning and, it is important in this discussion about learning at animal exhibits, to bear in mind issues raised by Leitcher, Hensel and Larsen (1989) who point out that in the formal teaching situation it is usually clear who is doing the teaching, or providing the information. Out of the classroom this clear distinction is not necessarily obvious. Adults may 'teach' children, and vice versa; siblings may educate each other, as may peers within a school group. These different 'teachers' are exemplified in comments identified within the transcripts, such as the father who said, 'Isn't this the fish that buries itself in mud in rivers and then can breathe air?', or the boy who announced with authority at a snake, '*This* is the one where the top part of it goes over the bottom one'. A number of visitors shared their knowledge with the rest of the group in a definitive manner, such as the boy who announced, 'I know that one, it's a leopard shark'. Some family members asked for information, as did this mother in the following example when she asked her knowledgeable son about the Lappet Faced Vultures and the apparent surfeit of skin on their necks, 'Does their neck stretch out then?'.

In a manner similar to a number of the Prologue conversations where Michael initiated exchanges, other children began and finished the conversation with the adult contributing in the middle utterance. This is the opposite situation from that described as triadic dialogue by Lemke (1990: ix) and is referred to in this thesis as *inverse triadic dialogue*:

> *At the Milk Snake*
>
> Boy: It's harmless.
> Mother: Well I thought Mother Nature had the poisonous ones bright coloured?
> Boy: She does, but this one imitates them.

Despite research that concludes that families come to museums to learn (e.g. Rosenfeld 1980; Hensel 1987), the two sets of family data considered in Table 4.6 show that the incidence of conversations with at least one 'knowledge source comment', e.g. 'I think that..', or 'That is..., 'I know....', or 'Why is..?', is low, although, as Hilke (1989) showed, families employ both personal and co-operative strategies for acquiring and disseminating information, but their preferred mode was to acquire information at an exhibit for themselves, which was then shared.

4.3 SCHOOL VISITS TO LONDON ZOO

In trying to elicit whether there is a similarity of content within conversations at live animal specimens generated by all visitors, it is necessary to compare the data obtained from the analysis of the conversations of families with that from school groups who observed the same live animal exhibits. The content of the conversations that were generated at London Zoo by primary school groups is shown in Table 2

Appendix 2b. The pattern is similar to that obtained from analysis of the data from the conversations of family groups (Table 13 Appendix 2b) in that naming was the most frequently referred to category and body parts and behaviours were commented on in similar proportions.

Table 4.7

The content of conversations * of the school groups compared with that of the family groups at London Zoo.

Category	Zoo animals school n = 459		Zoo animals families n = 143		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./Social	354	77	122	85	4.42		
Exhibit access	289	63	123	86	26.82	$p < 0.005$	0.05
Other exhibit	227	50	62	43	1.62		
Body parts	280	61	75	53	3.30		
Behaviour	301	66	95	66	0.04		
Naming	401	87	126	88	0.06		
Affective atts	193	42	29	20	22.20	$p < 0.005$	0.04
emotive	143	32	10	7	33.58	** $p << 0.005$	0.06
Interpretative	443	97	142	100	3.09		
knowledge source	254	53	82	57	0.18		
real/live	41	9	6	4	3.40		
Environment	19	4	9	6	N/A		

* All tables presented in this thesis refer to the number of conversations that contained at least one comment of a category. The numbers do not refer to the total number of comments. ** indicates the χ^2 value is over 30 and that there is a greater association.

The data obtained from analysing the conversations of the school groups is compared with that of the family groups at London Zoo in Table 4.7. The very many similarities are striking and unexpected, because of the different rationales for the visit, the school visits are for educational purposes and the family for social and leisure objectives.

The content of conversations generated during visits to London Zoo were similar and contained higher numbers of conversations with at least one reference within the social/management and interpretative categories, but the school groups generated significantly more affective attitudes including emotive ones. However, families may 'bond' in another emotional sense, even though they generated significantly fewer 'emotive comments', because they collaboratively searched and located animals in exhibits. The results, reported in Table 4.7 for affective and emotive comments, question the conclusions drawn by Rosenfeld (1980: 77) who, after studying family groups and *not* school groups, concluded that a formal classroom lesson, and by implication a visit made by school groups to a zoo, is 'information-rich, experience-poor' in direct contrast to the family experience in a zoo, 'information-poor, experience-rich'. However, if generating affective comments is a significant experience, school visits to a zoo, an extension of the formal classroom experience, are experience-rich in style and are 'experience-rich but information-mediocre'.

The data in Table 4.7 show that both groups, families and schools, shared a similar focus of comments about the animals and emphasises the similarity of the conversational content of the two groups. Families differed in that they uttered significantly fewer attitudinal and emotive comments than did school groups who passed more exhibit access comments.

Table 4. 8

A comparison of the number of conversations that were made by primary school and family groups at London Zoo animals

Category	Zoo animals schools n =459		Zoo animals families n = 143		χ_1^2	Probability	Phi^2
	no	%	no	%			
Body parts	280	61	75	53	3.30		
front end	77	17	17	12	1.97		
dimensions	237	52	62	43	2.99		
unfamiliar	32	7	7	5	N/A		
disrupters	57	11	15	11	0.39		
Behaviour	301	66	95	66	0.04		
position	177	39	49	34	0.86		
movement	130	28	35	25	0.81		
feeding	54	12	12	8	1.27		
attractors	115	25	30	21	0.99		
Naming	401	87	126	88	0.06		
identity	318	69	91	64	1.59		
category	220	48	57	40	2.86		
compare	87	19	62	43	34.86	$p<<0.005$	0.06
mistake	17	4	6	4	N/A		

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Table 4.8 compares the content of animal focused comments that were generated by these two separate groups and shows a similar shared pattern, except that family groups compared the animals with humans, artefacts and other animals significantly less.

This similarity of content between the school and family groups, two types of visitor traditionally assumed in the literature to have divergent rationales, is surprising because it suggests that schools may also have a social orientation even if they *do* undertake the visit to a zoo with a learning objective. Such a view is refuted by the results of a questionnaire conducted in 1991 in which teachers who visited London Zoo *claimed* that curriculum orientation was the major reason for organising a school visit to the zoo (Tunnicliffe 1994a). Either the learning and teaching in school groups was very low key or the families at London Zoo were teaching their children. It must be remembered that the data only show the *number* of conversations in which at *least one reference* to a category was made and not the *density of the comments* within conversations.

If the visitors *are* attending to the 'how' of the story that is being portrayed through the exhibit, it would be expected that they would comment on the label and other aspects of exhibit design and so is important to find out if they are commenting on other aspects of the exhibit than the animal specimens.

Table 4.9

Content of conversations referring to 'Other' aspects of exhibits (zoo animals)

Category - mentioned at least once in conversation	Schools n = 459		Families n = 143		χ_1^2	Probability	Phi^2
	no	%	no	%			
All exhibit focused	458	100	140	98	N/A		
Other exhibits	227	50	62	43	1.62		
Reference to label	53	12	14	10	0.34		

We find that observations about other aspects of exhibit are important to visitors. Table 4.9 shows the occurrence within the total conversations of those in which a comment about another aspect of the exhibit, other than the animal specimens, was mentioned at least once and the similarity in the data between the two groups of the number of occurrences of such a comment at least once in an exchange enables us to conclude that other aspects of the exhibit, which amplify the story, are important to the visitors.

School groups may have been responding their visit and to the animal exhibits in an everyday manner and not that of a focused, planned learning experience conducted by someone who knew what to look for in the exhibits. A major focus of school visitors was voicing affective attitudes (Table 4.7) and such an emphasis within the content of conversations could have been due to children interacting with each other more, taking a lead from the adults or feeling less constrained to discuss and react to the animals when not with their parents. An analysis of the different social groups and the content of their conversations should reveal whether their generation of such attitudes was particular to a specific social sub group or age group (Chapter 7).

A similar pattern of content of topics of conversation to that obtained from the analysis of the Michael transcript was found to exist within the family data and the school data, both of which reveal a similar overall pattern (Tables 2 and 5 in Appendix 2b). These results indicate that these visitors all possessed a similar personal knowledge of animals because they identified the animals using the same categories of names and referred to similar categories of attributes of both animals and exhibit.

The significant, and unexpectedly high, value for emotive attitude comments amongst the school group (Table 4.7) suggests either that an active effort was made to discuss attitudes towards the animals or, on the other hand, that the spontaneous comments of the group members were less inhibited and they expressed their feelings and opinions readily. It should, however, be borne in mind that, whilst the socio-economic groups of the leisure visitors to London Zoo is at the upper end of the spectrum (Ament 1994), that of the school children reflects all classes of society. The school group probably contained more children from the lower socio-economic groups whose families were not those which traditionally visit the zoo, and the children reacted to the zoo animals as they would to any other phenomenon. They commented out loud without any cultural inhibition.

Whilst the family groups were relatively homogenous, the social composition of the school group varied during the visit. Groups were either composed of a teacher and children, chaperone and children or children only. Hence, the data could be analysed according to these three subordinate groups. Such an analysis is presented and discussed in Chapter 7. It is possible that the pattern of occurrence of comments would occur irrespective of whether or not the animals were displayed as an exhibit, i.e. farm animals with no labels and designed setting. Therefore data obtained from school groups can be compared with that obtained from schools groups looking at animals on a farm where the animals are not exhibited. Families did not visit the farm hence comparable data was not available.

4. 4 CONTENT OF CONVERSATIONS GENERATED WHEN VIEWING LIVE ANIMALS AS EXHIBITS AND ON A FARM

The animals observed in the zoo were being *exhibited*. This very factor of looking at 'an exhibit' could have affected the content of comments of visitors at these exhibits. Did this occur? It is salutary to remember that the main difference between farm animals and those in the zoo were that farm animals were not exhibited; there were few species; the animals kept were likely to be more familiar to the visitors; the animals were not associated with conservation programmes nor were they from other geographical areas or traditionally thought of as 'zoological'.

Table 4.10

Comparison of contents of conversations amongst school groups at zoo animals (exhibited animals) and Burchetts Green Farm (non-exhibited animals)

Category	Zoo animals n = 459		Farm animals n = 248		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	354	77	196	79	0.34		
Exhibit access	289	63	96	39	38.16	$p<<0.005$	0.05
Other exhibit	227	50	91	37	10.61	$p<0.005$	0.03
Body parts	280	61	139	56	1.64		
Behaviour	301	66	129	52	12.43	$p<0.005$	0.02
Naming	401	87	105	42	160.42	$p<<0.005$	0.23
Affective atts	193	42	153	62	24.87	$p<0.005$	0.04
emotive	143	32	113	46	14.47	$p<0.005$	0.02
Interpretative	443	97	196	79	56.60	$p<<0.005$	0.08
knowledge sc	254	55	127	51	1.10		0.00
real/live	41	9	13	5	3.11		
Environment	19	4	1	0	N/A		

The school data for London Zoo can be compared with the data for similar age groups visiting a farm where the animals could be seen, but were not in specially designed enclosures nor did they have labels. The results of such a comparison of main categories are shown in Table 4.10 and Table 4.11 shows the results of a comparisons of the categories of animal observations.

Table 4.10 shows that management/social comments were a major focus of both groups and that they generated knowledge source comments and made observations about body parts and behaviour in similar numbers. However, the farm visitors were predominantly concerned with affective comments, in contrast the zoo groups passed interpretative comments to a significantly greater extent and named the animal in some way in nearly all exchanges. It is interesting that farm visitors made ‘other exhibit attribute’ comments. Although it was a significantly lower proportion of conversations, it is noteworthy that it occurred at all because the animals were not exhibits. This trait suggests that visitors used phenomena within the environment to set the animals in context and that observing the whole scene was important. In Prologue segment 27 Michael referred to the pots which were located in the viper exhibit and referred to that piece of exhibit furniture as the starting point in sharing some further information about vipers with his Aunt; whereas in segment 67 the Aunt referred to the tree in the bat exhibit. The similarity of the management/social component of conversations at the farm to that generated in the zoo is striking because the farm environment was less structured, smaller and not designed with visitors in mind.

The data in Table 4.11 shows that animal focused comments were far less apparent within the farm and the focus on naming manifest within the zoo was not present. Visitors identified or acknowledged the domestic animals.

Table 4.11

Comparison between animal focused content of conversations generated by school groups at animal exhibits in London Zoo and non-exhibit animals at a farm.

Category	Zoo animals n = 459		Farm animals n = 248		χ_1^2	probability	Phi^2
	no	%	no	%			
Body parts	280	61	139	56	1.64		
front end	77	17	46	19	0.35		
dimensions	237	52	100	40	8.26	$P<0.005$	0.01
unfamiliar	32	7	32	13	6.88	$p<0.010$	0.01
disrupters	57	12	7	3	18.01	$p<0.005$	0.03
Behaviour	301	66	129	52	12.43	$P<0.005$	0.02
position	177	39	34	14	47.50	$P<<0.005$	0.07
movement	130	28	29	12	25.54	$P<0.005$	0.04
feeding	54	12	43	17	4.23		
attractors	115	25	60	24	0.06		
Naming	401	87	105	42	160.42	$P<<0.005$	0.23
identity	318	69	89	36	73.50	$P<<0.005$	0.10
category	220	48	78	32	17.93	$P<0.005$	0.03
compare	87	19	29	12	6.19		
mistake	17	4	2	1	5.17		

A typical initial conversation on the farm is illustrated by the following exchange:

Girl:	Ah! look, little lambs, little lambs.
Girl 2:	Ah, little lambs.

A possible reason for the far lower number of conversations with at least one reference to a naming comment within the farm groups may be that many exchanges occurred at the same animal type, of which there were a number of individuals, for example a flock of sheep in a field and once the type to which the animal belonged had been recognised, the groups conducted conversations about the specimens without mentioning their identity again. This phenomenon is illustrated by the exchange shown below which discussed sheep.

Boy: Look at that one, they are coming really close to us.
Adult: It's standing there staring at you!
Boy: Right down there it's sitting down. It's been sat like that for ages, just going like that.
Boy 2: Yes.

It is interesting that the groups mentioned body parts of the animals in similar proportions, but zoo visitors mentioned behaviour at least once in a conversation significantly more often. The majority of behaviour of the animals viewed on the farm is familiar to the visitors, and only the unfamiliar, such as mounting of cows by bulls, or particularly noticeable, such as urination, were mentioned. In the above exchange the children noticed that a particular individual sheep had 'been sat like that for ages'.

On the other hand, zoo animals were unfamiliar and the recognition and commenting on a *familiar activity* performed by an *unfamiliar* animal was worthy of note. A more likely explanation of the higher number of behaviour comments is that zoo visitors mentioned the position of animals, this was judged by me to be a behaviour of the animal. The number of conversations with at least one interpretative comment was significantly lower at the farm, children could identify the type of animal, unlike the situation in the zoo where group members asked 'What is it?', or referred to the labels, of which there were none in the farm.

The farm did not provide labels for the animals and offered a less structured environment in terms of learning experience. Therefore, the significantly higher proportion of the comments containing emotive categories amongst groups visiting the farm (Table 4.10) was not surprising. The data indicate that farms are places for generating emotional comments, whereas the zoo is a site for factual observations and naming, but, in both sites, overall comments about body parts of animals were mentioned in similar numbers which is surprising if pupils visiting the zoo were being taught scientific naming of animals using specific structural attributes as criterial features for taxonomy. The result suggests that the pupils at the zoo were not learning the reasons for naming animals, but merely passing observational comments about parts of the bodies which they noticed. The farm displayed *familiar* animals involved in *familiar* activities and, in conjunction with the lack of educational orientation and tasks, conversations turned to the affective domain as a topic for conversation, because one was needed to fill the conversation void.

The comparison between the content of conversations generated at animal specimens in the zoo and the farm was made to explore whether exhibiting an animal made an impact on the categories about which visitors commented. The answer is affirmative. The comparison of the farm and zoo data shows that, although the farm visitors generated significantly more affective and fewer interpretative and behaviour comments than visitors at zoo animals, farm animals elicited similar numbers of conversations from visitors with at least one comment about body parts, knowledge source comments and management/social categories. The far higher number of conversations in the zoo which contained at least one naming comment is not surprising because of the familiarity to the visitors of the farm animals and the far fewer species on display and the far more specimens of each type that could be seen. Moreover, the farm animals were seen far more easily than were the exhibited zoo animals. Such findings suggest that farm visits *could* be developed to help children learn how to observe body structures and learn about general features of the animal groups, particularly mammals and birds, before embarking on a zoo visit where a more extensive range of animal groups, and examples within each group, may be observed.

4.5 ANIMAL MODELS THAT MOVE

Part of the expectation of a farm or zoo visit is that the animals are alive and move. The authenticity of the specimens is assumed by most visitors, but it is important, and Michael's implicit question of the 'realness' of a specimen, asking if it is plastic, (segment 25) illustrates this point. As discussed in Chapter 1, movement is the main criteria used by children to judge whether or not something is alive (e.g. Russell and Dennis 1940). Most behaviour involves movement or lack of it. Specific behaviours such as fighting, breathing, feeding were not categorised in the movement terminal of the network which referred to locomotory movements or general movement of body parts, e.g. tail swishing.

4.5.1 The conversations generated by school and family groups at animated models

The animated models are anomalous. On the one hand they provide visual and auditory clues that are shared with live animals and expected to be seen in live animals, movement and noises. On the other hand, the dinosaurs are exhibited within the museum, which, as discussed in Appendix 2a, is a cathedral-like building and possess 'museum ambience' which influences the attitudes of visitors (Linton and Young 1992). Furthermore, the animated dinosaur models portray images of unfamiliar animals, whereas the visitors do possess some familiarity with the overall types of preserved animal, even if not the species or genus, displayed in the museum.

The data for the main categories of conversational topic generated during visits of both school and family groups to animated dinosaurs are shown in Table 4.12.

Table 4.12

Comparison of content of conversations generated at animated models by school groups with that of family groups (main categories)

Category	School n = 422		Families n = 176		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt/social	304	72	147	84	8.84	$p<0.005$	0.02
Exhibit access	239	57	91	52	1.22		
Other exhibit comments	173	41	79	45	0.77		
Body parts	309	73	96	55	19.82	$p<0.005$	0.03
Behaviour	363	86	119	68	26.91	$p<0.005$	0.05
Naming	176	42	84	48	1.83		
Affective atts	229	54	93	53	0.10		
emotive	199	47	83	47	0.002		
Interpretative	400	95	136	77	40.99	$p<<0.005$	0.07
real/alive	170	40	63	36	1.05		
knowledge scr	329	78	116	66	9.48	$p<0.005$	0.02
Environment	19	5	13	7	N/A		

Comments generated about animated models were expected to reflect a blend of the two other sets of data, traditional museum exhibits and live animals. It was anticipated that visitors would pay particular attention to the movements and associated body parts and behaviours, as they did within the zoo, but would comment less about the exhibits and exhibit access than did groups in the zoo because the models would be more easily located. School groups would, it was anticipated, generate more knowledge source comments because of the formal educational aspect of the visit. Moreover, it was thought that the dramatic presentation of the diorama would generate more affective comments from both the school and family groups than were elicited at the static specimens.

The data in Table 4.12 shows that the assumptions anticipated about the proportions of comments were not all justified. Fewer social/management comments but more knowledge source comments were generated by the schools. The emphasis on observations about the animals, and comments related to them by school groups as part of their educational focus, is reflected in Table 4.13. The particular subordinate categories that were mentioned significantly more by schools than by the families were all aspects of the animals which are inherent within the story of the exhibits, the body parts and behaviours or the rationale of the visit, knowledge source comments.

Table 4.13

Comparison of content of conversations generated at animated models by school groups with that of family groups (animal observations)

Category	School n = 422		Families n = 176		χ_1^2	Probability	Phi^2
	no	%	no	%			
Body parts	309	73	96	55	19.82	$p<0.005$	0.03
front end	113	27	13	7	28.08	$p<0.005$	0.05
dimensions	173	41	58	33	3.39		
unfamiliar	59	14	19	11	1.11		
disrupters	162	38	34	19	20.50	$p<0.005$	0.03
Behaviour	363	86	119	68	26.91	$p<0.005$	0.05
position	80	19	17	10	7.90	$p<0.005$	0.01
movement	249	59	65	37	24.27	$p<0.005$	0.04
feeding	127	30	53	30	0.00		
attractors	182	43	66	38	1.62		
Naming	176	42	84	48	1.86		
identity	147	35	73	42	2.36		
category	85	20	46	26	2.61		
compare	41	10	23	13	1.46		
mistake	6	1	0	0	N/A		

However, given the learning overtones that visitors to the Natural History Museum associated with a family visit and the tradition of family teaching (Clarke and Miles 1980), it is extremely surprising that the conversations of family groups contained the significantly fewer references at least once to body parts, behaviour and interpretative comments. Moreover, the school groups generated significantly more interpretative comments about the exhibits than did families although both groups generated affective comments with the same frequency, unlike the findings for families and schools observing zoo animals where families generated significantly fewer affective comments

Table 4.14

Comments generated at animated models by school and family groups about 'other' aspects of the exhibits

Other Exhibit Comments Category total for schools = 173 and for families = 79	School groups (n = 422) no	 %	Family groups (n = 176) no	 %	χ_1^2	Probability	Phi^2
setting	108	26	40	23	0.55		
labels	24	6	6	3	1.36		
direct involvement, e.g. hearing, smelling shouting at animals	66	15	16	9	3.71		
reference to exhibit furniture	79	13	19	7	12.26	$p<0.005$	0.02

It is interesting to note (Table 4.14) that school groups referred to the exhibit furniture significantly more than did the families, reflecting the tendency noted in school groups at other types of exhibits, that items within the exhibits were used to locate specimens and enrich the story line.

The data show that both family and school groups viewing animated dinosaur models commented to the same extent in the following categories:

- finding the specimens;
- drawing to the attention of other members of their groups an aspect of both the animal or the exhibit;
- naming the animals;

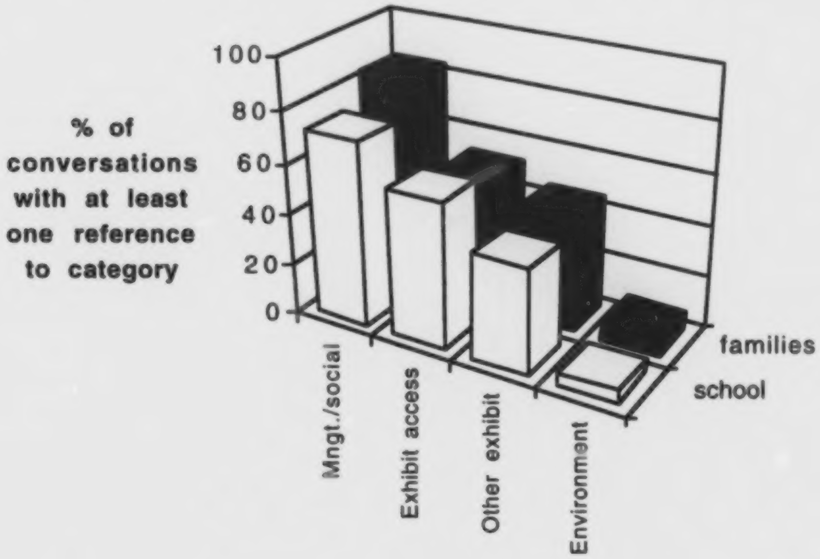
- passing affective comments, including emotive ones and like and dislike comments and noises, to the same extent.

However, the school groups (Tables 4.13 and 4.14) commented significantly more about:

- body parts;
- behaviours;
- the exhibits, interpreting them to a significantly greater extent, including generating knowledge source comments, reflecting an observational emphasis related to learning.

Figure 4.1

Comparison of the data referring to the conversational content of school and family groups that was generated at the animated models (main categories)



The data shown in Figure 4.1 indicate that a very similar content in topics is generated by both groups, school or family, at the animated models except in the management/social category. This result reflects the more social focus of the family visit. The emphasis of school groups on observations about body parts and behaviours but the similarity in naming is shown in Figure 4.2 drawn from data in Table 4.13.

Figure 4.2

Conversational content generated by school and family groups at animated models (animal observations)

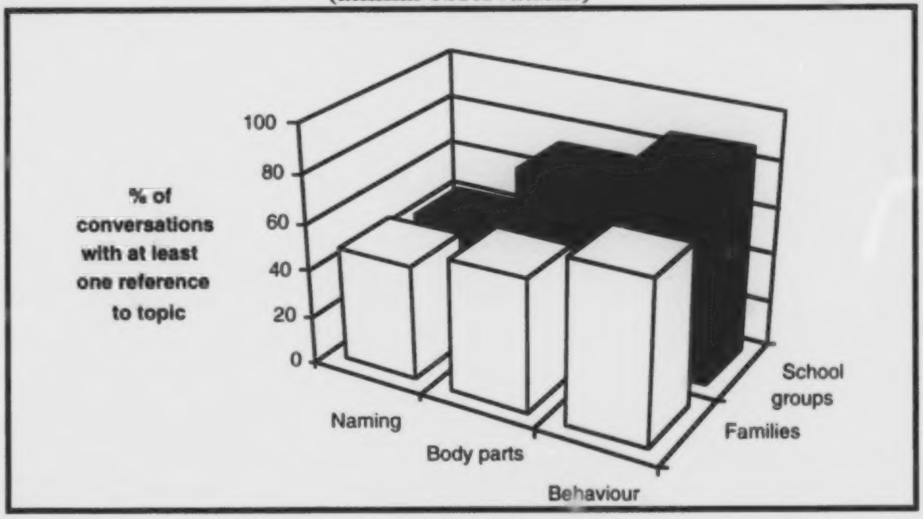


Figure 4.3

Conversational content generated at the animated models by school and family groups (narrative topics)

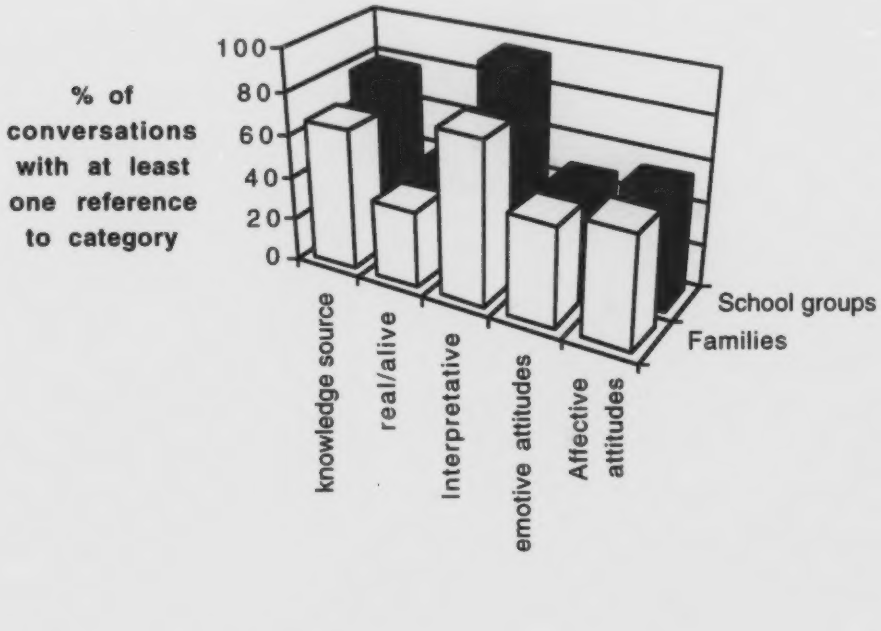


Figure 4.3 shows that the comments focused on the animated models had a characteristic pattern of their own, derived from the novelty and dramatic nature of the exhibits. Within the categories of narrative comments, *both* groups produced affective comments and those related to the reality of the specimens to the same extent but, as would be expected if school groups were acquiring new facts and constructing meaning, school groups generated significantly more knowledge source comments.

Comments are a measure of the interest of the visitors, according to Falk and Dierking (1992:100), and the animated models stimulated comments. However, the lower rates of comments about animal observations, other than naming and interpretative comments, amongst family groups are interesting. Does this mean that the families were not as interested? Animated models are a different type of exhibit from either traditional or live specimens, but the differences perceived may be that of the enigma which the models present, alive or dead, or be due to the novelty nature of the subject, whole three dimensional dinosaurs are not part of the experience of visitors although skeletons are. However, a child who looked at skeletons of a human and a dog in the mammal corridor, after looking at the dinosaur skeletons, referred to those of the two mammals with the comment,' Look! More dinosaurs', the three dimensional skeletons of the dinosaurs *were* 'dinosaurs' for this young child and skeletons were not associated in her mind with the three dimensional whole models of dinosaurs shown in the animatronic exhibits. Moreover, visitors had no experience of seeing dinosaur exhibits that look like other living animals, and, although they may have recollected images, gathered from films and childhood comics, such memories were not referred to at the exhibits by school groups. The school data were collected before the film 'Jurassic Park' was released, the family data afterwards, even so there were scarcely any comments referring to the film, except a few references to the *Velociraptors,* which appeared to replace *T. rex* in the repertoire of existing knowledge amongst the children about dinosaurs. The dinosaur exhibits overawed the families and repressed their comments. Field observations show that many family groups said nothing, or very little, at the exhibits, a phenomenon not noticed at other exhibits where they stopped, and yet to interpret lack of conversation as a lack of interest would be an error, groups *did* stop, look and listen, often a complete cycle of behaviour. This is a limitation of the data gathering technique and we do not know what they said in reflection after they left these exhibits.

One cause of the low rate of conversations containing naming comments may have been unfamiliarity with the subject. Others might have been the visitors' lack of knowledge of a specific name to refer to the animals as well as the tacit understanding that the exhibits were dinosaurs because they are positioned in the Dinosaur Gallery. However, rather as occurred on the farm where there were few *different* species of animal to see, there were only two named species of dinosaur exhibited as animated models in the museum, hence only two specific names to use. Furthermore, lack of name usage could have been an instance of everyone within a group knowing the name of the group, thus rendering its use unnecessary. The animated models offer a different type of exhibit experience for visitors. Family groups were overawed, but the models were used by school groups to focus on the salient features that were emphasised in the design of the exhibits. The predominant focus predominance on affective issues related to the exhibits is shown in the similar number of conversations with at least one affective comment within both groups which, however, held different rationales for undertaking their visit. This finding is an interesting reflection of the impact of this new type of museum exhibit.

4.5.2 Comparison of the content of conversations at animatronics and zoo animals

If a model has the attributes of living animals do the children notice those attributes to the same extent that they do with the zoo animals?

4.5.2a School groups

Table 4.15 (below) displays the data from the school groups at London Zoo and at the Natural History Museum, London, where the children looked at the animated dinosaur models, so that comparison between the different data can be made. As the data reported in able 4.15 show, school groups that viewed either live animals or the animated models had a similar focus about exhibit access, management and social topics, other aspects of exhibits such as labels, interpretative comments.

Table 4.15

Comparisons between conversations of school groups at zoo animals and the animated models

Category	Zoo animals n = 459		Animated models n = 422		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	354	77	304	72	3.00		
Exhibit access	289	63	239	57	3.66		
Other exhibit	227	50	173	41	6.34		
Body parts	280	61	309	73	14.82	$p<0.005$	0.03
Behaviour	301	66	363	86	49.49	$p<<0.005$	0.06
Naming	401	87	176	42	202.80	$p<<0.005$	0.21
Affective atts	193	42	229	54	13.1	$p<0.005$	0.02
emotive	143	32	199	47	23.70	$p<0.005$	0.04
Interpretative	443	97	400	95	1.59		
knowledge source	254	55	329	78	50.28	$p<<0.005$	0.05
real/live	41	9	170	40	118.65	$p<<0..005$	0.14
Environment	19	4	19	5	0.07		

In view of the considerable efforts which the zoo put into disseminating the conservation message, one not explicit but implicit within the dinosaur exhibits, it is surprising that comments about the environmental aspects from school groups at both sites were low. In the case of both school groups the rationale for the visit was at least partially educational and the significant differences in the knowledge source comments (much less in the zoo) between the two groups is interesting, and cause for concern to biology educators. In part the data may reflect the effect of the ambience of the surroundings upon the groups, the museum being perceived as a site of learning.

However, the results shown in Table 4.15 may be indicative of an attitude amongst schools that the zoo was predominately an experience of a social nature with some observations of animals, despite the answers given to questionnaires seeking to establish rationale for making such visits (Tunnicliffe 1994a). The very focused nature of the dinosaur exhibits and their clear message drew the attention of the groups to particular aspects of the exhibits that the designers considered salient, in the diorama of meat eating animals attacking and devouring a plant eater, and at the exhibit-model of its similarity to a modern living reptile, the visitors received the message *and* discussed it. Conversely, explicit and inherent messages of the zoo exhibits were largely not received.

Unexpectedly, the animated models elicited a higher proportion of conversations that contained affective comments than was the case at the zoo. This finding is in direct contrast to the notion prevalent amongst teachers and zoo educators that the site for affective comments is the zoo, although we have seen from the data collected for this thesis that this category was higher in farms than in zoos and must remember that the conversational content was *not* coded for frequency of occurrence, only mention at least once in a conversation. The type of comments at the models were:

- expressing dislike of a feature in the exhibit, as in the following exchange between two year 2 boys:

Boy 1: Oh it's neck!'
Boy 2: Ugh! Gross!'

- more restrained comments, shown by the following remark from an adult:

Boy: Ugh, Mum! Look, its neck's torn!
Adult: It's not very nice is it?

- of an anthropomorphic type of interpretation, as in the following two separate comments:

Adult: Isn't it a shame? The poor thing is hungry.
Child: They didn't mean to do it [kill and eat the large dinosaur].

Table 4.16, below, shows that the museum animatronic exhibits stimulated statistically significantly greater interest than did the zoo animals in the subcategories of 'body parts' except that of dimensions and in all the subcategories of behaviour, but were significantly less concerned with naming.

Table 4.16

Comparison of content of conversations made by school groups at zoo animals and animated models (animal observations

Category	Live animals n = 459 no	%	Animated models n = 422 no	%	χ_1^2	Probability	Phi ^{2}
Body parts	280	61	309	73	14.82	$p<0.005$	0.17
front end	77	17	113	27	13.00	$p<0.005$	0.02
dimensions	237	52	173	41	10.00	$p<0.005$	0.01
unfamiliar	32	7	59	14	11.66	$p<0.005$	0.01
disrupters	57	12	162	38	79.34	$p<<0.005$	0.09
Behaviour	301	66	363	86	49.49	$p<<0.005$	0.09
position	177	39	80	19	40.90	$p<<0.005$	0.07
movement	130	28	249	59	84.44	$p<<0.005$	0.05
feeding	54	12	127	30	45.25	$p<<0.005$	0.10
attractors	115	25	182	43	32.14	$p<<0.005$	0.05
Naming	401	87	176	42	202.81	$p<<0.005$	0.21
identity	318	69	147	35	104.69	$p<<0.005$	0.12
category	220	48	85	20	75.00	$p<<0.005$	0.09
compare	87	19	41	10	15.11	$p<0.005$	0.02
mistake	17	4	6	1	4.50		

Teachers used the dinosaur exhibits to provide further information for their pupils, illustrated in the following exchange at the 'lizard like' dinosaur model. The sequence also illustrates the use of existing knowledge in 'labelling' and categorising animal specimens:

Girl 1: A lizard!
Girl 2: A chameleon.
Teacher: Is it breathing?
Girl 1: He just made movements, I can see a lump.
Teacher: That's where the air is going into his body because he is breathing.
Girl 2: Where's a lump?
Girl 1: When we breathe. [Teacher demonstrated human breathing movements and the girls copied)
Girl 1: Look at his tail.

Other adults and teachers stressed one of the messages of the diorama, categorisation as either meat eaters or plant eaters, by asking their charges, 'Are they plant eaters or meat eaters?'. Some adults drew the attention of the children to, or asked them to work out, the characteristics of the meat eaters, referring to the claws and sharp teeth, which are clearly shown on the models of the carnivorous dinosaurs. On occasion, insensitive verbal treatment of children occurred in response to a child's query, losing the opportunity for a positive teaching opportunity. In the following exchange a year 2 boy asked the teacher, 'Is that a *T. rex*?'. She abruptly responded, 'Which are you talking about?' When the child showed her, she replied, 'I wouldn't think so, it's got large front legs', this statement curtailed the exchange.

The potential range of names that could be used is much greater at the zoo than at the museum animated model exhibits which contain only 5 animal specimens in total, representing three different species, only two of which were named in the labels. Therefore it is not surprising that there was no use of a vernacular name, because there is none, nor that naming comments overall were low. The term 'dinosaur' was used for the popular reference to the animals, e.g. an adult remarked, 'They're not real dinosaurs, they're models.'

However, it is not unexpected that the groups remarked about behaviour of both types of animal specimens (Table 4.16), because movement of the specimens drew the eye of the observer to the action. The movements of the dinosaur models were predictable, sequenced and repeated, therefore it is not surprising that more comments about behaviour occurred more at least once in conversations generated in front of them, than at the zoo, where the animals were often asleep, and sometimes invisible.

One of the focal features of the dinosaur diorama are the noises. It is a bi-sensory exhibit in terms of the number of senses that may be used to perceive it. As has already been noted, Maurer (1973) found that sound is an important criterion in children's assessing whether an object was living, and perceiving an exhibit by a sense other than sight seems to lead to a comment because the experience is out of the ordinary, as were Michael's other comments in segment 9 of the Prologue. A number of children commented about the noises at the diorama, e.g. 'Why did it make that noise?' inquired an eight year old. The periodic regular roars that the animal exhibits emitted, purporting to be generated by the three carnivorous animals, both stopped the children talking and were a source of comment. The following two statements reflect two contrasting views about hearing the roars, 'That noise made me jump!' but 'Oh! I was so amazed by that noise!'

Teachers used the roaring noise as a cue for teaching their pupils. In the following exchange a question was posed to a mixed group by a year 1 teacher, 'Why do you think that they made that noise?'. A year 3 teacher drew her pupils' attention to the noise and provided some information about them, 'Listen to all these noises and things; it's what it sounded like when the dinosaurs were alive, the insects and things.'

The dinosaur models, particularly those exhibited in the diorama, elicited comments seeking interaction. Hence these models, whilst being grouped as *dynamic* (according to the schema in Table 2.2) are also *active*, proving an opportunity for mental interaction with the exhibit. As one year 3 pupil remarked, 'If you put your hand there it will bite it!'. A year 3 boy urged the dinosaurs to more action, 'Stop mucking around and eat him!'. One year 3 girl expressed the sentiment, 'I hope that it's not really real', to which a boy in her group responded, 'Yeah! and then they'll come out on us', his utterance was cut off by the roars of the exhibit. In effect, the sequence of periodic roars controlled the flow of the conversations of the visitors because they stopped their conversations whilst the noises were emitted and frequently started a new conversation when the noise had ceased. This is an unusual example of interaction between exhibit and visitor. Knowledge acquired before the visit was frequently used in the conversations at the animatronics. A number of children were very knowledgeable about dinosaurs, and teachers in particular asked these pupils to share their knowledge, a phenomenon not noticed at the other types of animal exhibits. In the following exchange the teacher drew on one year 1 pupil's knowledge and skilfully persuaded him to clarify his identification. but failed to ask him *how* he knew.

Teacher:	Can you explain what they are Max?
Max:	Uhm, they are *Deinonychus.*
Teacher:	Which ones? I'm not sure.
Max:	Those ones with the claws.

The labels were used, overtly and covertly, as is shown in the following exchange amongst a group of year 3 pupils and their chaperone:

Boy:	What animal is that? Is that a *Brontosaurus*?
Adult:	I don't know- read the label back there.
Boy:	Well one of them *is Brontosaurus.*
Adult:	Ah, *Deinonychus.*
Boy:	What are they like?

The adult with the following group of year 3 of boys and girls used the information provided apparently to re-emphasise a point of management with her group. This sequence occurred towards the end of a morning in the 'exhibit cruising phase' (Table 1.4) of the visit.

Adult:	Normally, that big one there, it says, strayed from the herd and these captured it. It's like running off, so stay here with the 'herd'.
Boy:	When can we have lunch?
Adult:	In about a quarter of an hour.

Other individuals read the label and use the text in their subsequent dialogue, 'text echoing', and illustrated by a teacher in the following direct quote to her reception infant pupils from the label 'About 150 million years ago *Terontosaurus* strayed from its herd and the smaller dinosaurs were able to kill it.'

A description of the two exhibits that contained animated models is provided in Appendix 2a. It is particularly noticeable amongst the transcripts of conversations at the animatronic specimens that the young children judged the status or life history stage of the animals by their size, an observation made by Looft (1971). This following comment generated by a year 1 girl at the diorama, where the largest dinosaur is being eaten by the smaller ones, illustrates the point, 'Why is the mummy not moving?', as does the following comment from another year 1 (6 years old), 'Why are the babies eating their mummy?'.

The data from school visits to the animated models shows that groups:

- focused and commented in particular on those aspects of the structure and behaviour of the models that are highlighted through the exhibit design;
- used their existing knowledge in interpreting the exhibits;
- amplified their knowledge from the labels,

and that adults provided teaching for the children at the models by using cues provided in the exhibit.

4.5.2b Family groups

A similar pattern of comments within conversations at the dinosaur exhibits is seen in the data resulting from the analysis of the transcripts of families, the data are shown in

Tables 4.17 and 4.18 below. It is apparent that the content of such conversations reflected the particular social orientation of the families, with a higher incidence of management and social comments and less about animal observations. The impact of the animated dinosaur exhibits on the content of family conversations is shown in Table 4.17 and 4.18. The content of the conversations of family groups commenting about the animatronics reflected the pattern seen amongst school groups. They made fewer interpretative and naming comments than at live animal exhibits, but significantly more affective ones than did equivalent groups at the zoo.

Table 4.17

Comparison between content of conversations of family groups at zoo animals the zoo and the animated models (main categories)

Category	Zoo animals n = 143		Animated models n = 176		χ_1^2	Probability	Phi ^{2}
	no	%	no	%			
Mngt./social	122	85	147	84	0.19		
Exhibit access	123	86	91	52	42.06	$p<<0.005$	0.13
Other exhibit	62	43	79	45	0.80		
Body parts	75	53	96	55	0.14		
Behaviour	95	66	119	68	0.5		
Naming	126	88	84	48	57.20	$p<<0.005$	0.18
Affective atts	29	20	93	53	35.42	$p<<0.005$	0.11
emotive	10	7	83	47	N/A		0.19
Interpretative	142	100	136	77	34.18	$p<<0.005$	0.12
knowledge source	82	57	119	68	3.57		
real/live	6	4	18	10	4.13		
Environment	9	6	13	7	0.15		

In contrast to the findings from the data in Table 4.16 for school groups, the data in Table 4.17 show that zoo families have to search for the animals within the zoo exhibits resulting in a significantly higher incidence of both exhibit access and other exhibit comments.

Table 4.18

Comparison between content of conversations generated by family groups at zoo animals and the animated models (animal observations)

Category	Live animals n = 143 no	%	Animated models n = 176 no	%	χ_1 2	Probability	4
Body parts	75	53	96	55	0.14		
front end	17	12	13	7	1.88		
dimensions	62	43	58	33	3.64		
unfamiliar	7	5	19	11	3.67		
disrupters	15	11	34	19	4.73		
Behaviour	95	66	119	68	0.05		
position	49	34	17	10	29.11	$p<0.005$	0.09
movement	35	25	65	37	5.69		
feeding	12	8	53	30	22.95	$p<0.005$	0.07
attractors	30	21	66	38	10.24	$p<0.005$	0.03
Naming	126	88	84	48	57.20	$p<<0.005$	0.18
identity	91	64	73	42	15.51	$p<0.005$	0.05
category	57	40	46	26	55.46	$p<<0.005$	0.17
compare	62	43	23	13	37.03	$p<<0.005$	0.12
mistake	6	4	0	0	N/A		

It is an unexpected finding, revealed in the data in Table 4.18, that at both types of exhibit the families focused on body parts to the same extent. However, it was not surprising that the families looking at zoo animals referred significantly more to the position of the specimens, for this type of comment is associated with locating the animal and subsequently sharing the information with others. It is also interesting to note that families took the opportunity to comment on the salient behaviours of the dinosaur exhibits, feeding and attention attracting behaviours such as fighting, which were explicit within the story line portrayed.

The dinosaur exhibits particularly attracted the attention and comments of visitors. However, the wide variety of different animal species in the zoo meant naming was the predominant animal focused occupation as visitors categorised the animals to their satisfaction. The animated models were clearly visible and doing something, in direct contrast to most zoo specimens, they therefore elicited more comments based on direct observations. There was no predominant conversational topic at dinosaur exhibits for families, they commented on the major topics equally as often.

4.5.3 A comparison of the content of conversations amongst school groups at farm animals (non-exhibits) and animated models (exhibits)

The comments generated amongst the school groups at both farm animals and the exhibited zoo animals have been considered earlier in this chapter. The analysis shows that the act of providing an exhibit, which focused on live animals, appeared to influence the content of the conversations (Tables 4.10 and 4.11). School groups observing the farm animals, generated more attitude and emotive comments, less about behaviour and naming, but a similar number of conversations with at least one reference to management/social issues, about body parts, knowledge sources and other items in the vicinity of the animals, such as drinking bowls, the equivalent to 'exhibit furniture'. Moreover, a significantly lower exhibit access value suggests that the animal specimens on the farm were easier to locate, and hence observe. Therefore, for completeness, it is necessary to compare the data obtained from the conversations of the school groups at farm animals with those obtained from school groups at animated models.

Table 4. 19

Comparison of the content of conversations of school groups at animated models and farm animals (main categories)

Category	Animated models n = 422		Farm animals n = 248		χ_1^2	Probability	Phi ^{2}
	no	%	no	%			
Mngt/social	304	72	177	71	00.03		
Exhibit access	239	57	96	39	20.08	$p<0.005$	0.03
Other exhibit	173	41	91	37	1.21		
Body parts	309	73	139	56	20.80	$p<0.005$	0.03
Behaviour	363	86	129	52	95.57	$p<<0.005$	0.14
Naming	176	42	105	42	00.03		
Affective atts	229	54	153	62	13.24	$p<0.005$	0.02
emotive	199	47	113	46	4.73		
Interpretative	400	95	196	79	39.46	$p<<0.005$	0.06
knowledge sce	329	81	127	51	51.43	$p<<0.005$	0.08
real/live	170	40	13	5	96.62	$p<<0.005$	0.14
Environment	20	5	1	1	N/A		

The data presented in Table 4.19 show that there are more differences than similarities between the numbers of conversations at the dinosaurs that contain reference at least once to the main topics of conversation and those at the farm. It is unsurprising, on the one hand, that the comparison of farm data with the data from the animated dinosaurs shows similarities (Tables 4.19 and 4.20).

Table 4.20

Comparison of content of conversations of school groups at animated models and farm animals (animal observations)

Category	Animated models n = 422		Farm animals n = 248		χ_1^2	Probability	Phi ^{2}
	no	%	no	%			
Body parts	309	73	139	56	20.80	$p<0.005$	0.03
front end	113	27	46	19	5.84		
dimensions	173	41	100	40	0.03		
unfamiliar	59	14	32	13	0.16		
disrupters	162	38	7	3	104.76	$p \ll 0.005$	0.16
Behaviour	363	86	129	52	92.57	$p \ll 0.005$	0.14
position	80	19	34	14	3.05		
movement	249	59	29	12	144.02	$p \ll 0.005$	0.26
feeding	127	30	43	17	13.42	$p <0.005$	0.02
attractors	182	43	60	24	24.27	$p <0.005$	0.04
Naming	176	42	105	42	0.03		
identity	147	35	89	36	0.08		
category	85	20	78	32	10.90	$p<0.005$	0.02
compare	41	10	29	12	0.65		
mistake	6	1	2	1	N/A		

There were few different species of animals and their behaviours were clearly observable. The data obtained from analysis of the transcripts of the conversations of school groups observing live animals has been compared with those obtained from similar groups but whose members viewed the animated models. Both kinds of exhibits showed, in the case of the live zoo animals were expected to do so, the attributes of movement, the main characteristic of live animals. On the other hand, the two types of specimens were viewed in disparate settings and, furthermore, one specimen type was authentic, the other man made. Knowledge comments were low and so affective comments may have replaced those of knowledge source in the time-budget for conversation. The far higher number of conversations with affective comments that are generated at farm animals is noteworthy and may be a refection of a different emphasis within the school group. Moreover, the lack of 'messages' for visiting groups within the farm is reflected in the more affective nature of the conversational content and less interpretative comments. The effectiveness of the animated models in drawing the attention of visitors to salient features that are integral to understanding the message inherent within the exhibit is reflected in the data of Table 4.20, above, which shows that the visitors commented on the parts of the body and the behaviours that the models showed through movements. The data in Table 4. 20 show that body parts that move, e.g. head, tail, and their associated actions were noticed and commented upon. Moreover, both the actions and the performers were novel, unlike the situation on the farm where many animals grazed, ambled and grazed, not behaviour that is innovative and exciting to watch. However, naming was a similar major focus for the school groups at both types of exhibit, although far fewer conversations at both sites contained names than was observed at zoo animals. The concept of 'meat eaters' was very much part of the message of the dinosaur diorama, but it is particularly interesting that 'categories', e.g. pig, were referred to more within the farm data, where there were more species, even though the animals were familiar to the group members.

A comparison of the data from conversations at farm animals with that for the school groups visiting the animated dinosaur models shows the superiority of moving animal specimens displayed in a specially designed exhibit in attracting comments about the particular attributes that are salient to the specimens. The story of such exhibits reaches the visitors.

4.6 OVERVIEW

This section considers the impact of observing moving animals on the conversational content of two distinct groups of visitors, schools and families. Michael's family's transcript established the pattern of referring to an animal, locating it within the exhibit and naming it to the visitors' satisfaction, then describing a salient behaviour and associated body parts. A similar pattern of content was found in other groups. Whilst there were differences according to the nature of the exhibits, there was a striking similarity in the pattern of the contents of the conversations of both school and family groups at the live animal exhibits and at the animated dinosaurs (Figures 4.4 a, b and c).

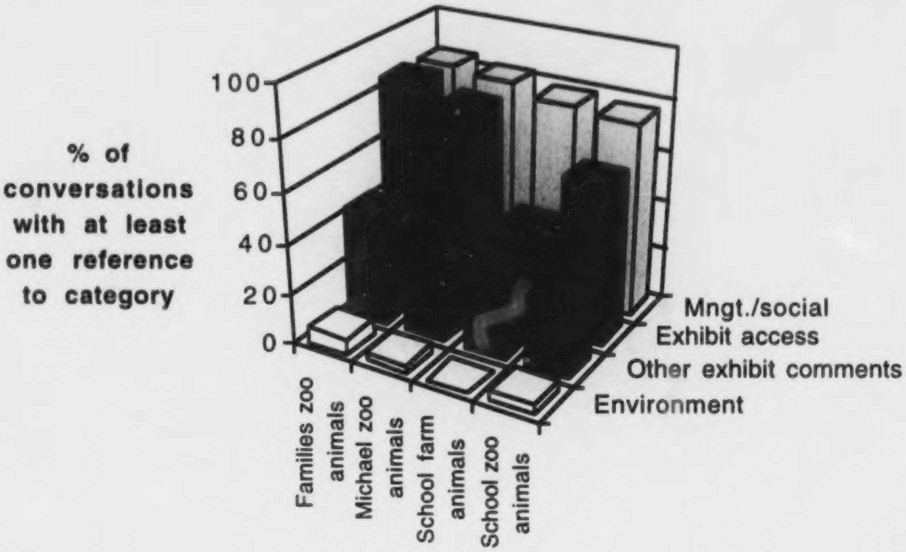
Presenting an animal that *may* move as an exhibit provides more for a visitor to observe than just a specimen, labels and scenery for instance, and telling a story through the exhibit in which an animal is the focus, generate similar proportions of comments (Figure 4.4a) except live animals have drawbacks as exhibit specimens.

Figure 4.4

Comparison of content of conversations at zoo animals, London Zoo, (school and family groups), and farm animals.

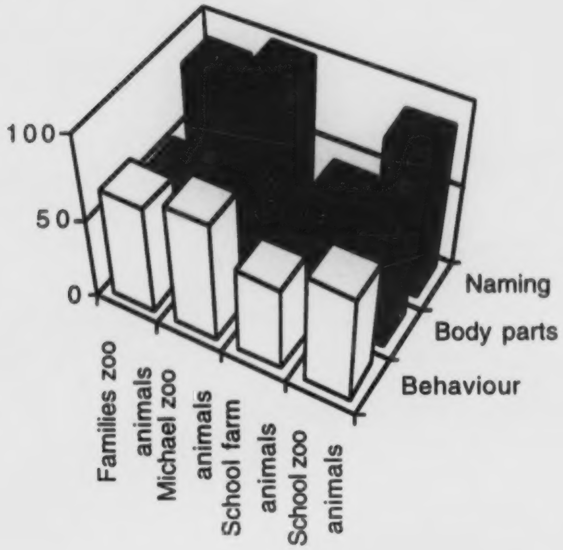
Figure 4.4a

Site and visit rationale related comments



Live animals can choose their position within the exhibit which causes the visitors to search for them. Such activity, and the subsequent drawing of attention of others to it using ostensive comments, formed one of the major topics within conversation in zoos, exhibit access. In contrast, all groups had considerable focus on management social issues which was surprisingly uniform at all moving animal specimens. Did the groups show such a similarity in content of animal focused comments?

Figure 4.4b
Animal observations



The main categories of animal focused comments are presented in Figure 4.4b. The figure shows that the conversational content had a similar pattern at all live animal exhibits in the proportions of comments about naming, behaviour, and body parts. Where there was a variety of animals naming was the topic of priority, followed by behaviour comments and those about body parts. However, in the farm, where there were few species and those were familiar to the visitors, naming was the least prevalent category of comment and both body parts and behaviour comments were equally frequent.

Reference to Figure 4.4c below shows that the farm visit was essentially one of an affective nature, in which a large number of emotive comments were generated. Conversely, there were fewer interpretative comments, a direct contrast with the conversational emphasis at animal exhibits in the zoo.

Figure 4.4c

Narrative comments

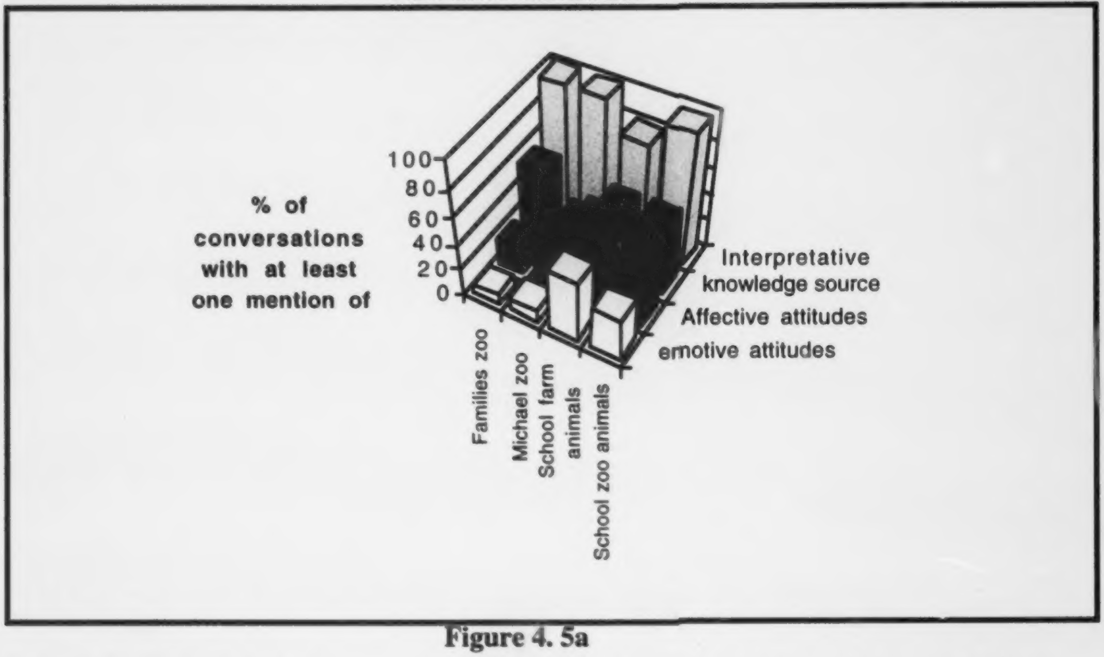
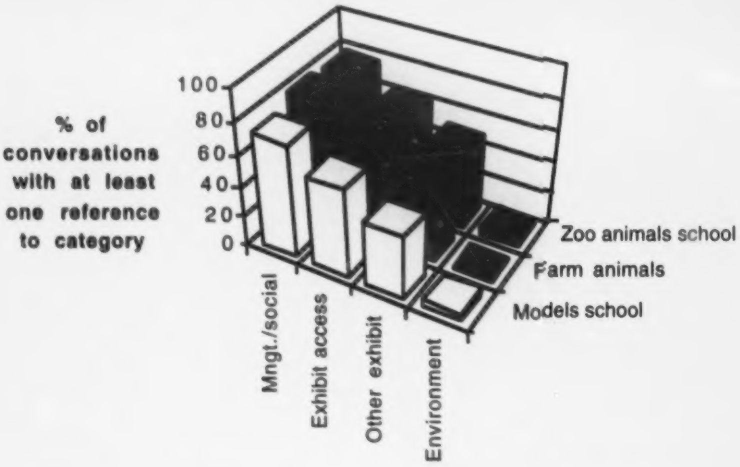


Figure 4. 5a

Comparison of content of conversations generated by school groups at live animals and animated models (site and visit rationale related comments)



Figures 4. 4a, b and c show that the live zoo animal as an exhibit is superior to live animals *not* presented as exhibits, i.e. the farm animals, in drawing observations about them from visitors. Live animal did not elicit a significant proportion of affective,

including emotive, comments amongst families but school groups were involved in generating such comments in over one third of conversations at the zoo and in almost two thirds of farm exchanges. However, it should be noted from Figure 4.5b and Tables 4.15 and 4.19 that animated models were superior in eliciting observations from school groups than were live animals.

Figure 4.5a shows that school groups shared a high emphasis on control and social comments but it was highest within the zoo, which may be because the zoo was a more extensive site than the other two locations. It is however, not unexpected that zoo groups commented most about other aspects of the exhibits and exhibit access, for, as the data for families showed, the specimens had to be searched out.

Figure 4.5b

Animal observation comments

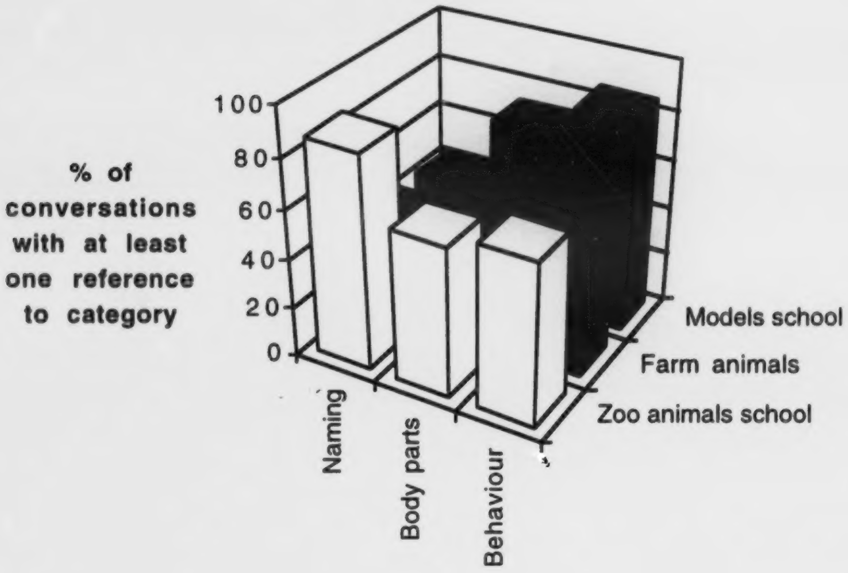


Figure 4.5b shows that the animated models appeared to provide a more effective exhibit for children to observe and comment about body parts and behaviour of the animals, as well as interpreting the exhibit. The planned exhibit featuring animated models generated far more comments about behaviour and body parts than did the unpredictable live animals.

Figure 4. 5c
Narrative comments

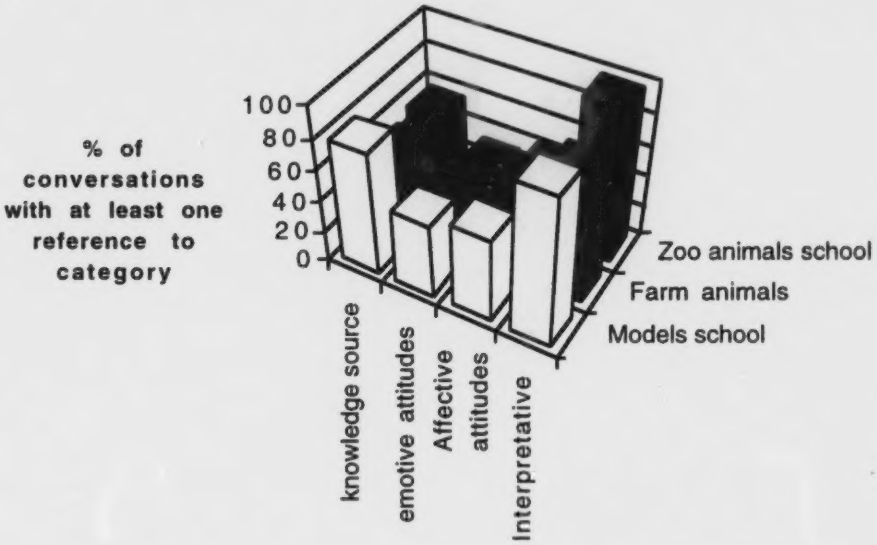


Figure 4.5c shows that animated models elicited a similar number of conversations that contained at least one affective attitudes comment as did the farm visit but significantly more knowledge source comments (Table 4.19). The zoo visitors generated fewest comments in these two categories. Visitors explained the animals to their own satisfaction and did so more at animal exhibits (Figure 4.5c). The data presented in Figure 4.5c challenge the often voiced opinion that it is the zoo visit that is the affective experience. It is time to reassess the impact of visits to animal exhibits on the visitors.

Summary

If educators wish their pupils, and families their children, to learn about the range of animal species, the variety of live animals, the zoo visit provides that opportunity. If on the other hand, adults wish children to focus on particular behaviours and associated body parts, animated models should be the exhibit of choice. Conversely, a visit to a farm provides an essentially affective experience which is likely to be memorable. The data suggest that there is a similarity in what visitors comment about when looking at live animals and, furthermore, the data suggest that the everyday understanding about animals and not the information supplied by the zoo, that forms the content of the comments of the visitors. However, the exhibits containing animated models of unfamiliar animals, the dinosaurs, provide learning cues to help visitors receive the message which is inherent within the exhibits. Some teachers use those cues in developing the knowledge and understanding of their pupils. These planned exhibits have a greater influence over the content of conversations than do the unpredictable live animals. Furthermore, the data show that children have an understanding of movement and noise as indicators of an animal being alive.

The data further suggest that farm visits do have potential for learning by school groups, for they commented about the same aspect of animals as those who looked at live animals and animated models, but at a lower frequency. The data infer that an educational focus could render the farm visit more effective in terms of learning if children were involved in tasks that required them to make systematic observations. The farm data, when compared to zoo data, show clearly that *exhibiting* an animal specimen influences the proportion of direct animal observations made by visitors. Taxonomic biology of the type in which school children and the public can be actively involved is, above all, an observational science, but, if it were occurring within the zoo there should have been significant differences between all body part comments when compared with the farm data. This was not so. The potential for learning taxonomy, rather than everyday naming, within the zoo is great, but it is not being realised.

Furthermore, the nature of the content of the conversations varies at the animated model according to the social context, family or school visit. However, contrary to previous research, families and school groups at the same zoo show differences in content only in exhibit access and affective attitude categories. Either families are teaching children or schools have a different emphasis than that given as and generally expected to be the rationale for educational visit, some educational task. The message planned into the exhibit appears to be received by the visitors to the animated dinosaurs but the message implicit, and explicit, in live animal exhibits does not affect conversations in such a profound manner. These findings have important implications for educators and exhibit designers when considering the role of animals in helping children construct their understanding of animals and their diversity.

CHAPTER 5

CONVERSATIONS AT MUSEUM AND ZOO ANIMALS

Passive museum specimens, by their nature, are unable to exhibit the prime attribute, movement, used by children as a criterion of 'alive'. This chapter, therefore, considers the effect of such exhibits, by comparison with zoo visits. It will provide:

- a comparison in the overall content of conversations of school groups at the two types of authentic animal specimens as exhibits;
- a comparison in the overall content of conversations of family groups at the two types of authentic animal specimens as exhibits;
- consider whether there existed a similarity in what the visitors observed and commented about at the *live* and *preserved, static* specimens;
- whether any difference or similarity was particular to school groups or to family groups and whether all groups responded in the same manner to the two types of exhibit;
- consider whether the type and pattern of the conversations generated by families was reflected within the school conversations.

5.1 COMPARISON OF MAIN TOPICS OF CONTENT OF CONVERSATIONS GENERATED AT ZOO OR MUSEUM ANIMALS BY SCHOOL GROUPS AND FAMILIES

5.1.1. Comparison of content of conversations of school and family groups at museum animals

The data obtained from analysis of the content of the conversations of both school and family groups at the static animal specimens exhibited within the museum are presented in Tables 5.1, 5.2, and 5.3.

Table 5.1 is a comparison of the main categories of conversational data between the two groups. Significant differences (<.005 level) exist for comments on both management/social, other exhibit comments, body parts, responses that are emotive.

In all these categories, apart from comments of a management and social nature, the frequency, i.e. taking into account the size of the samples, was largest for the school groups. I suggest that these data are simply a reflection of the different focus of the visits. In the case of the school groups the rationale for the visit was, at least partially, of a formal educational nature.

Table 5.1

Comparison of the number of comments made by school and family groups at museum animals

Category	School Groups n = 407		Family groups n = 184		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	270	66	142	77	7.05	$p<0.01$	0.01
Exhibit access	219	54	108	59	1.23		
Other exhibit	220	54	52	28	33.04	$p<<0.005$	0.06
Body parts	248	61	80	44	15.63	$p<0.005$	0.03
Behaviour	152	37	56	30	2.65		
Naming	344	85	167	91	4.21		
Affective atts	158	39	64	35	0.89		
emotive atts	145	36	41	22	10.46	$p<0.005$	0.02
Interpretative	395	97	177	96	N/A		
knowledge source	296	73	128	70	0.63		
real/not real	65	16	18	10	4.01		
Environment	45	11	13	7	2.28		

Therefore, it was to be expected that the children and the accompanying adults would pay great attention to relevant biological details and this would explain the more frequent comments on body parts and the authenticity of the specimens. Note however, that the Phi^2 values show the associations, although statistically significant, to be very weak.

Table 5.1 shows that there was a similarity in conversational content between school and family groups at the preserved specimens, except that for schools commented significantly more about other aspects of the exhibit, body parts and emotive attitudes and families generated more management/social comments. The far higher management and social component of conversations in family groups was striking, suggesting a focus on the exhibit from school groups and a greater emphasis on social bonding, as well as control, amongst the leisure visitors. Such a finding is not surprising because of the social orientation of the motives of families enjoying such visits (Leitcher, Hensel and Larsen 1989). It is an unexpected finding that, despite the overtones of learning, the conversations of school groups generated significantly *more* affective and emotive attitudes than did family conversations. The likely influence of the assumed motivation of school groups, an orientation towards viewing particular aspects of specimens, body parts and parts of the exhibit, is shown within the data in Table 5.1. It is an unexpected finding that, despite the overtones of an expectation of cognitive learning, the conversations of school groups generated significantly more affective and emotive comments than did family conversations, although once again these associations are weak as shown by the low values of Phi ^{2}.

Table 5. 2

Comparison of the number of comments made by school and family groups at museum animals (animal observations)

Category	School Groups n = 407		Family Groups n = 184		χ_1^2	Probability	Phi ^{2}
	no	%	no	%			
Body parts	248	61	80	40	15.63	$p<0.005$	0.03
front end	67	17	17	12	5.42		
dimensions	198	49	62	34	11.50	$p<0.005$	0.02
unfamiliar	67	17	7	5	18.54	$p<0.005$	0.03
disrupters	39	10	15	8	0.31		
Behaviour	152	37	56	30	2.65		
position	69	17	19	10	4.39		
movement	40	10	12	7	1.73		
food related	28	7	13	7	0.08		
attractors	63	16	26	14	0.18		
Naming	344	85	167	91	4.21		
identity	297	74	154	84	8.06	$p<0.005$	0.01
category	232	57	126	69	6.99	$p<0.01$	0.01
compare	166	41	46	25	13.72	$p<0.005$	0.02
mistake	23	6	22	12	7.17	$p<0.01$	0.01

A major focus of both groups was comments about the animals. What was it that interested visitors about the animals and what differences existed between the two groups? Table 5.2 shows a summary of the data for these comments which had a specific focus on the animal specimens. These data show that school groups commented significantly more about the body parts, the dimensions of the animals, unfamiliar parts of the animal, i.e. excretory organs, and compared the animals with themselves more than family groups who focused their attention on naming, identifying and categorising the animals, making significantly more mistakes in the process. It is interesting to note that the ethos of the school visit gave pupils, and their accompanying adults, the opportunity to comment on salient features of the animals which are not provided to the same extent within the families. In contrast, the leisure visit seemed to stimulate a greater interest in the identification of species.

Table 5.2 illustrates the predominance for families to identify, categorise and compare animals and make more mistakes in these tasks and the school groups to focus on body parts, principally unfamiliar body parts and dimensions of the specimens, such as size or colour.

Table 5.3

'Other' exhibit comments at museum animals

Category	School groups n = 407		Family groups n = 184		χ_1^2	Probability	Phi^2
	no	%	no	%			
Exhibit focused	407	100	184	100	N/A		
Other exhibit	220	54	52	28	33.94	$p<<0.005$	0.06
setting	80	20	21	11	6.08		
exhibit furniture	97	24	5	3	39.56	$p<<0.005$	0.07
mention direct involvement	62	15	18	10	3.22		
reference to labels	60	15	18	10	2.72		

The content of conversations of school groups referred significantly more to other aspects of the exhibit (Table 5.3) mentioning exhibit furniture in particular. Both groups appeared to depend on their personal knowledge in interpreting the exhibits (Table 5.1) in a manner reminiscent of the groups at the moving specimens (Chapter 4). In summary, the two groups in the museum:

- looked at similar features of the preserved animals, including potential behaviours;

but:

- schools groups commented more about the attributes, in particular all the body parts and the position of the animal in the exhibit, than did the families;
- members of families named animals significantly more, labelling and categorising the specimens, but made more mistakes and no direct reference to labels;
- schools compared animals with humans, other objects and animals more;
- members of school groups commented about other aspects of the exhibits significantly more, but not labels;
- family group members held more conversational exchanges that contained management or social comments.

School groups used the specimens as a focus of discussion more than did the family groups and referred to both the location of the animals and the physical attributes of the specimens, and compared the animals with other forms. On the other hand, the likely influence of the assumed leisure motivations of families gave the natural history collection a particular emphasis. Family conversations:

- generated more management comments than did school groups;
- made significantly fewer comments about other parts of the exhibit.

However, such data are relatively meaningless unless compared with similar data obtained from the conversations of similar children in the zoo. The data from both contexts, museum and zoo, preserved or live, need to be compared to see if a pattern of looking at 'animals' is present irrespective of whether the animal specimen is alive or preserved.

5.1.2 Comparison of conversations generated at museum animals with that generated at zoo animals

The data contained within Table 5.4 show that conversations within the museum contained fewer management and social comments than those on the zoo.

Table 5. 4

Comparison of content of conversations between school groups at zoo and museum animals (main topics)

Category	Museum animals n = 407		Zoo animals n = 459		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt/Social	270	66	354	77	12.46	$p<0.005$	0.01
Exhibit access	219	54	289	63	7.46	$p<0.01$	0.01
Other exhibit	220	54	227	50	1.83		
Body parts	243	61	280	61	0.15		
Behaviour	152	37	301	66	68.92	$p<<0.005$	0.08
Naming	344	85	401	87	1.45		
Affective atts	158	39	193	42	0.93		
emotive	145	36	143	32	1.94		
Interpretative	395	97	443	97	0.20		
real/alive	65	15	41	9	9.95	$p<0.005$	0.01
knowledge source	296	72	254	55	28.15	$p<<0.005$	0.03
Environment	45	11	19	4	15.08	$p<0.005$	0.12

The data in Table 5.4 suggest that the museum presented an environment more conducive to looking and discussing the specimens without additional distractions or need for control. In contrast the school visitors to live zoo animals generated significantly more conversations that contained at least one reference to exhibit access, presumably because the live animals were more difficult to locate within exhibits, which in turn is a reflection upon the design of the exhibits.

Both groups generated affective comments to the same extent. In view of the different nature of the two types of animal exhibits whose data are being considered, the lack of predominance of affective comments in the conversations of school groups within the museum was a surprising finding. The significantly higher number of comments about environmental issues in the museum at the preserved specimens is also surprising; the opposite situation is assumed to be the case by zoo managements. Both results are a low proportion of all conversations and the educational implications of this finding will be discussed in Chapter 10.

Table 5.5

Comparison of content of conversations of school groups at museum and zoo animals (animal observations)

Category	Museum animals		Zoo animals		χ_1^2	Probability	Phi^2
	n = 407		n = 459				
	no	%	no	%			
Body parts	243	60	280	61	0.15		
front end	67	17	77	17	0.02		
dimensions	198	49	237	52	0.80		
unfamiliar	67	17	32	7	19.19	$p<0.005$	0.02
disrupters	39	10	57	12	1.76		
Behaviour	152	37	301	66	68.92	$p<<0.005$	0.08
position	69	17	177	89	49.53	$p<<0.005$	0.06
movement	40	10	130	28	46.77	$p<<0.005$	0.05
feeding	28	7	54	12	6.01		
attractors	63	16	115	25	12.11	$p<0.005$	0.02
Naming	344	85	401	88	1.45		
identity	297	74	318	69	1.43		
category	232	57	220	48	7.12	$p<0.01$	0.01
compare	166	41	87	19	49.72	$p<<0.005$	0.06
mistake	23	6	17	4	1.87		

Table 5.5 shows that the majority of the school visits had a focus which centred on observations of animals. However, the data show that the difference in the type of specimen, preserved and static, or live and potentially moving, engendered a difference in emphasis of conversational content. Overall naming comments did occur in similar amounts, the groups in the museum had a similar variety of specimens to observe as did the zoo groups, but the traditional museum specimens were readily visible, and the museum visitor categorised and compared animals significantly more, although the associations were weak in absolute terms. Specimens were located nearer to each other in the museum which may account for some of the comments that compared animals. Unfamiliar parts of animals were noticed significantly more than in the zoo because these parts were easily viewed on a static specimens in an exhibit *designed for visitors to observe* closely. However, attractors and movements were, not surprisingly, mentioned significantly more for the live animals that made the actions associated with the behaviours. Although this thesis is not concerned with ‘holding power’ of exhibits in the different contexts, it was

noticeable that the museum exhibits tended to generate longer conversations than did those of the zoo. The following 'panda' conversations are typical.

At the Giant Panda exhibit in the Natural History Museum.

Year 3 mixed Caucasian and Afro Caribbean children

Boy: Yes, there was this critter, alive, then they shot him.
Girl: He's real.
Boy: No.
Boy 2: Yes! Ah ! Look!
Boy: Real body.
Girl: If he's real, why isn't he moving?
Girl 2: That was him and that and that, all of them were him.
Boy 2: I wish it were real. Come alive!
Boy 1: I expect they killed him.
Teacher: Do you think they killed him Marvin?
Boy: No, he just got old and died.
Teacher: I expect so, yes.
Boy 1: And then they made a model of him!
Teacher: Do you know which country these animals come from?
Girl: No!
Boy: Africa.
Boy 2: China.
Teacher: That's good!
Boy: You read the map down there.
Boy 2: I knew that, dummy.
Teacher: Do you know what those things are? (pointing to bamboo shoots in case)
Boy: Bamboo.
Teacher: Why did they put bamboo in here?
Boy 2: That's what it's eating.
Teacher: Why'd they put bamboo in?
Boy: Because that's what he eats.
Teacher: Is he a flesh eater or a plant eater?

10 year. old children (year 5)

Girl: It's a lovely Chinese panda. Look! It's at London Zoo.
Girl: It's dead now.
Boy: Oh! You mean they used him? They used him? They stuffed him?
Boy: They took out all his innards and that and stuffed him.
Boy: They stuffed him, ugh ! (they went to look at the bones) They make me sick.
Girl: That's Chi Chi..
Girl 2: Ah, that's Chi Chi.
Girl: Ah!
Boy: Did they really eat grass? Did they really eat all them stuff?
Adult: The bamboo? Yeah.
Boy: Yeah. Ugh! Bamboo sticks.
Girl: Is that the actual panda?
Adult: Yes.
Boy: Are they real bamboo sticks, that lot there?
Adult: I think so, they look real don't they?
Boy: Yes!

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The following two conversations generated in front of the Giant Panda the zoo are shorter:

Year 4 children , 9-10 yr olds

Boy: Ah! Ah! Ah!
Girl: I got a toy panda at home called Chi Chi, I got him here.
Boy: Is it a boy panda or a girl panda?
Teacher: Male.
Girl: Oh look! Cute isn't it?
Boy: Is the other one out?

Year 4 children

Boy : It's big!
Girl: Isn't that what they call the Giant Panda?
Boy: Look at his bum!
Girl: I can't see the other panda.
Teacher: Can you see all his bedding, or whatever it is, bamboo?
Boy: He eats bamboo shoots.

Table 5.6

Conversational comments of school groups at zoo and museum animals about 'other' aspects of the exhibits

Category	Museum animals n = 407		Zoo animals n =459		χ_1^2	Probability	Phi^2
	no	%	no	%			
'Other' exhibit	220	54	227	50	1.83		
exhibit furniture	97	24	112	24	0.04		
direct involvement	62	15	56	12	1.69		
setting	80	20	82	18	0.46		
reference to label	60	15	53	12	1.94		

Table 5.6 shows that there were no significant differences between school groups referring to other aspects of the exhibit which is a surprising finding. Zoo exhibits are designed with the welfare of the animal as a higher priority than the message the exhibit sends to visitors, the opposite is the case in the museum. The zoo animals required more searching for, indicated by a significantly higher number of conversations with at least one exhibit access comment (Table 5.4), yet the zoo school groups referred to exhibit furniture, which visitors use as a locator reference for specimens, no more than did the museum groups. This finding suggests that either a member of a zoo group knew where to look for the animal and *frequently showed* ,

not told, the other group members the location of the animal, not always pinpointing this with a verbal reference to exhibit furniture. Alternatively groups may have tended to view and talk about readily visible specimens. The other aspects of the exhibit may be pertinent to both groups in telling the story about an animal and placing the specimen in context.

School groups observed, and then commented about, a similar range of attributes in the zoo and museum, but, in the Natural History Museum:

- there were significantly fewer management/social and exhibit access comments contained within the conversations;
- significantly less discussion about behaviour.

but

- significantly more comments about:
  - unfamiliar body parts;
  - categorisation of the specimens, e.g. 'Look! Hippopotamus', or at the Komodo Dragon, 'It's a lizard';
  - knowledge source comments;
  - environmental issues - the natural habitat or references to conservation topics such as the endangered status of the species;

- significantly more comparisons made between:
  - the specimens and other animals, e.g. a year 5 boy at a Kudu exclaimed: 'It's so big! It looks like a horse or something!'. In the Mammal Hall a boy remarked, 'It looks like a pig'. To which the teacher replied, 'It does look like a pig doesn't it? It's a wild boar.';
  - between other animals and human form. This year 5 boy remarked that he knew the animals had been alive, 'I can tell by the eyes'. 'How?', asked the teacher. 'They look like normal people's eyes', responded the pupil.

It is surprising, in view of the nature of the static exhibits, that over 1/3rd of conversations contained at least one comment about behaviour. The animal specimens, around which the comments focused, were static and displayed the behaviour associated with the position in which they were posed. For example, the following comment referred to the feet of the Sititunga in the Mammal Hall, 'Oh look, they are all splayed out'. Other comments are about behaviours that *might* have been made by the animal and are suggested by the exhibits, e.g. 'The panda sits up and eats its bamboo'. The higher incidence of environmental comments is surprising because London Zoo, at the time of data collection, had adopted an overt mission regarding conservation and instigated a comprehensive labelling programme. Whereas the museum, particularly in Discovering Mammals[1], did not promote the conservation and habitat message so openly.

Collections of preserved animals presented an opportunity for school groups to focus on the specimens whose attributes could be seen clearly and whose positions were both predictable and constant. The ambience and physical characteristics of the museum provided an environment in which the need to manage the groups was significantly less than the outside environment of the zoo, where the ambience may have been more distracting than that inside the museum, discouraging a group of children and their accompanying adult to focus their attention on the animal specimens. It is interesting that the same proportion of conversations contained at least one comment about other aspects of the exhibit in both locations although zoo exhibits are designed primarily for the animals and those of the museum for the visitors. In contrast Birney (1986) found that the school children recollected such aspects of the exhibits from museums, but not from zoos.

5.1.3. An overview of conversational content of school groups at museum and zoo animals

The following charts summarise and highlight the similarities and differences between the school conversations at the two *sites* each with a different *type* of animal specimen.

When the differences in the nature and presentation of the static and live specimens are considered, the data presented (Figures 5.1, 5.2 and 5.3) show that the school groups generated conversations that showed a similar trend of content in comments about the exhibits (Figure 5.1 below).

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[1] personal communication Head of Public Services 1995

Figure 5.1

The content of conversations of school groups at museum and zoo animals

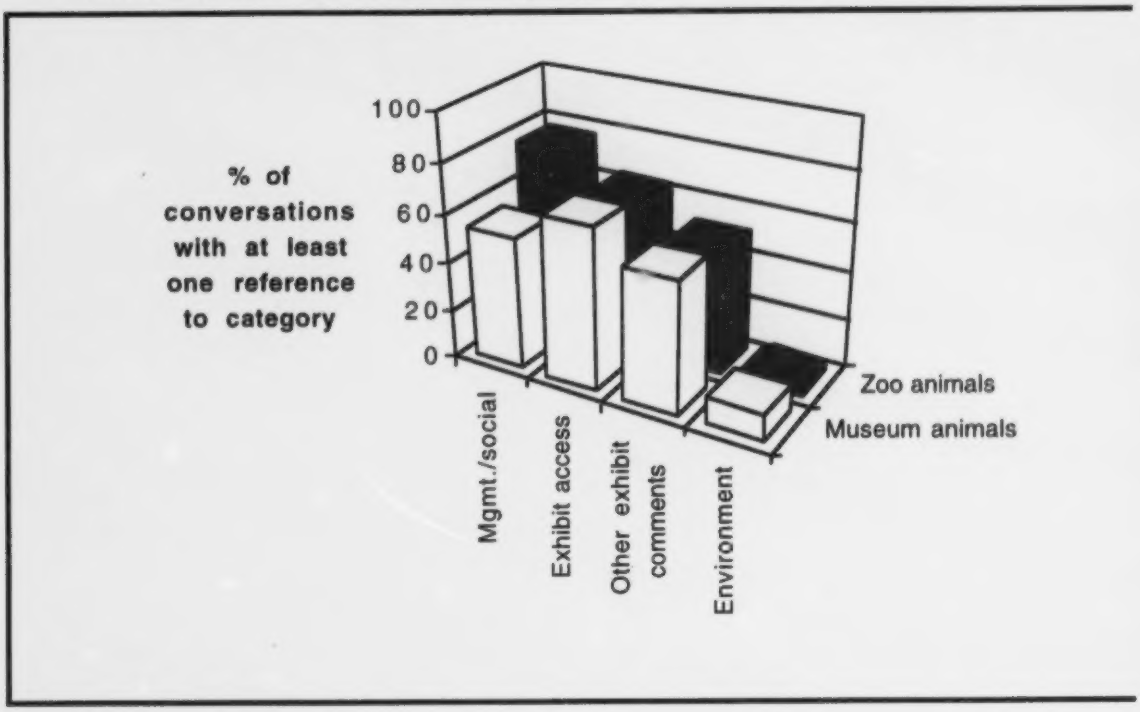


Figure 5.1 shows that the zoo groups generated significantly more comments in the management/social and exhibit access categories whereas the museum groups generated significantly more comments concerning environmental issues, albeit a low percentage when compared with the number of conversations referring to other topics.

Figure 5.2

The content of conversations of school groups at museum and zoo animals (animal observations)

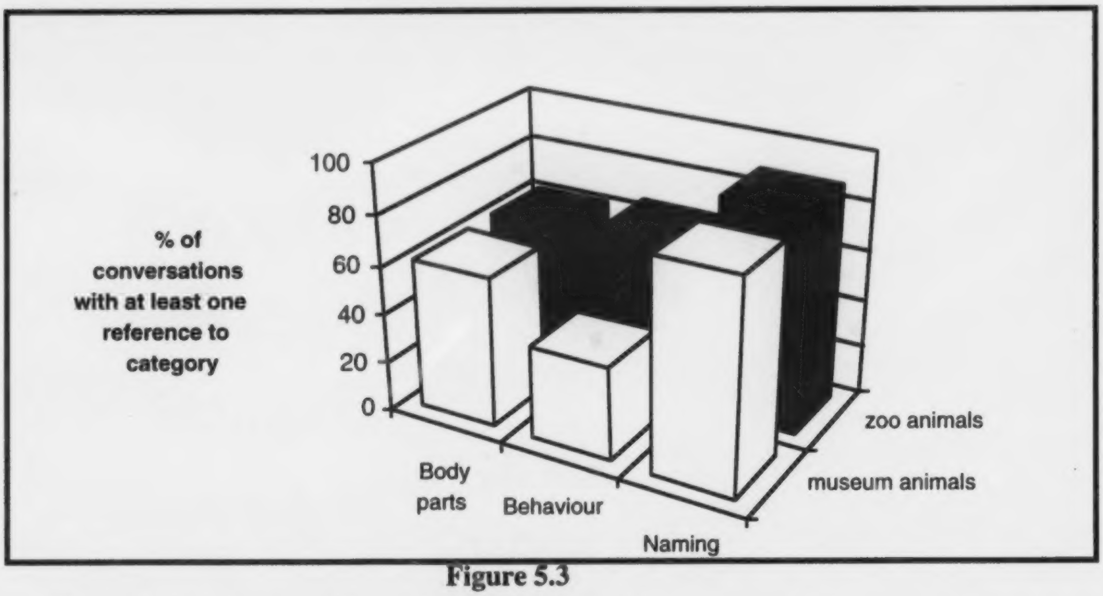


Figure 5.3

The content of conversations of school groups at museum and zoo animals (narrative comments)

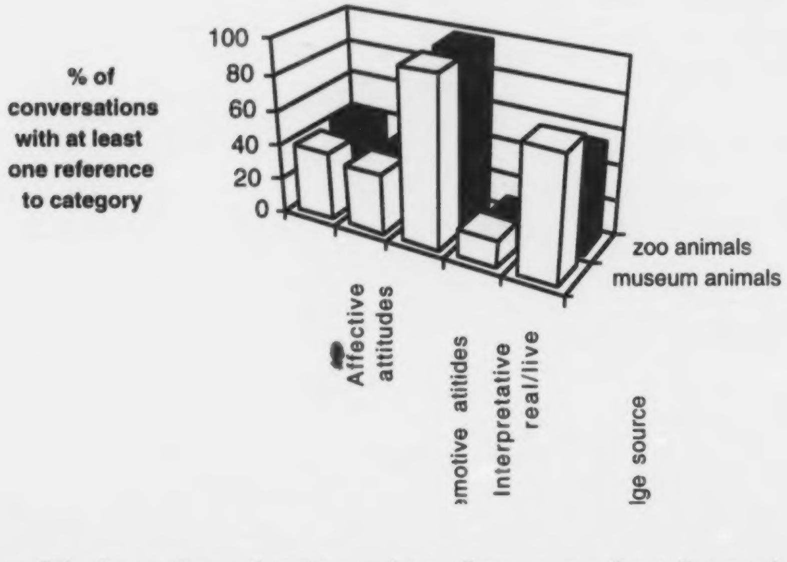


Figure 5.2, above, shows that the numbers of comments about direct animal observations. Considering that the preserved animals are static and display the one

behaviour in which they are posed the number of conversations referring at least once to a behaviour are surprising. The similarity in the number of conversations that mention naming or body parts at least once is striking.

Figure 5.3, above, shows the similarity in numbers of comments through which the visitors interpret the animals they observe. The similarity between the contents of the two school groups at either museum or zoo animals is striking when it is remembered that museum animals are static, yet both types of animal specimen elicit similar numbers of affective (including emotive) comments. Visitors interpreted the animals in a similar way except that school groups in museums generate significantly more knowledge source comments and more observations about the authenticity of specimens (Table 5.4). However, the differences associated with the ambience of the two sites and the nature of the specimens affected the conversational content. Significantly more conversations that referred at least once to management/social and exhibit access comments were made in the zoo.

The museum provided an environment wherein the focus of conversation was less concerned with social and management issues, finding the specimens within the exhibits and direct commentaries about the animals, than was the case in the zoo. The museum visit to view static/preserved animal specimens did elicit knowledge source comments and there were more instances within the transcripts of what Hensel (1987: 104-107) referred to as school talk or 'talking to teach'. However, the advantages of a visit to the museum, from the perspective of the teacher who wished to ensure that the pupils viewed specimens that would help them meet the learning task set, was summarised by the following exchange in the Natural History Museum:

Teacher: They all look a bit stuffed.
Adult: Well they are!
Teacher: Yes, but I mean, to me the only thing I suppose about having stuffed animal as opposed to live ones, if you go to the zoo, you spend hours waiting for the live ones.
Girl: Yes, you just stand there.

5.2. COMPARISON OF CONVERSATIONAL CONTENT OF FAMILY GROUPS AT MUSEUM AND ZOO ANIMALS

5.2.1 The content of the conversations

The data obtained from analysing the content of conversations of family groups in the two locations, London Zoo and the Natural History Museum, looking at live animal specimens or traditional preserved specimens, can be compared (Table 5.7 and 5.8).

Table 5. 7

Comparison of content of conversations of family groups at museum and zoo animals

Category	Museum animals n = 184		Zoo animals n = 143		χ_1^2	Probab-ility	Phi^2
	no	%	no	%			
Mngt/ social	142	77	125	85	5.63		
Exhibit access	108	59	123	86	28.96	$p<<0.005$	0.09
Other exhibit comments	52	28	62	43	8.08	$p<0.005$	0.03
Body parts	80	44	75	53	2.59		
Behaviour	56	30	95	66	41.96	$p<<0.005$	0.13
Naming	167	91	126	88	0.61		
Affective atts	64	35	29	20	8.32	$p<0.005$	0.03
emotive	41	22	31	10	0.02		
Interpretative	177	96	142	100	3.25		
knowledge source	128	70	82	57	5.23		
real/alive	18	10	6	4	3.70		
Environment	16	9	20	5	2.30		

The data presented in Table 5.7 shows a similarity in content in the categories within the conversations of families, the pattern of which reflects the predominant social and process oriented agenda of family visits. However, differences due to the nature and location of exhibits were apparent within the data. Not unexpectedly, the families visiting zoos commented more on behaviour, a result of watching live animals, but it was both contrary to intuition and surprising that families generated comments about behaviour in just under a third of all their exchanges and significantly more ($p<0.005$) on affective attitudes in the museum than in the zoo.

Table 5.8

Comparison between the content of conversations of family groups at museum and zoo animals

Category	Museum animals n = 184		Zoo animals n = 143		χ_1^2	Probability	Phi^2
	no	%	no	%			
Body parts	80	44	75	53	2.59		
front end	15	8	17	12	1.27		
dimensions	69	38	62	43	1.15		
unfamiliar	13	7	7	5	N/A		
disrupters	12	8	15	11	1.67		
Behaviour	56	30	95	66	41.96	$p<<0.005$	0.13
position	19	10	49	34	28.00	$p<0.005$	0.09
movement	12	7	35	25	21.07	$p<0.005$	0.07
food	13	7	12	8	0.20		
attractors	26	14	30	21	2.66		
Naming	167	91	126	88	0.61		
identity	154	84	91	64	17.23	$p<0.005$	0.05
category	126	69	57	40	26.74	$p<0.005$	0.08
compare	46	25	62	43	12.25	$p<0.005$	0.04
mistake	22	12	6	4	6.18		

Table 5.8 shows that naming animals and commenting on body parts were the predominant comment categories referred to by families at the preserved and live specimens. However, although at both sites which have an extensive range of animal species, the museum families identified and categorised the animals significantly more. In contrast the zoo families compared specimens. A commonality of references to body parts was found amongst both groups of visitors. Compared with the family groups visiting the zoo, families within the museum:

- generated more affective attitudinal comments;
- found the animal in the exhibit more easily than in the zoo, with less comment, but passed less 'other exhibit' comments, including use of the label;
- commented on the body parts in proportions similar to 'zoo' families;
- commented about behaviours significantly less than do the 'zoo' families but it is worthy of note that behaviour featured in 30% of exchanges;

- the overall naming pattern of specimens was similar, however, but significantly more animals were both 'labelled' and categorised by the visitors to the natural history collection, who compared the specimens less.

It is surprising that, unlike the results obtained from the analysis of data from transcripts of conversations generated by school groups in the two settings, the families visiting the museum did not comment statistically more about environmental issues, but they generated significantly more affective attitudes, including emotive comments. Families commented upon 'reality' to the same extent in the zoo and museum but significantly less about other aspects of exhibits in the museum. In contrast the school groups commented on these features to the same extent.

Figures 5.4, 5.5 and 5.6 summarise the content of the conversation of the family groups in museums and zoo. Figure 5.4 clearly shows that a difference in emphasis on exhibit access and other exhibit comments occurred significantly more in the zoo where visitors had to actively seek the animals within the exhibits.

Figure 5.4

Content of conversations of school and family groups at museum and zoo animals (main topic)

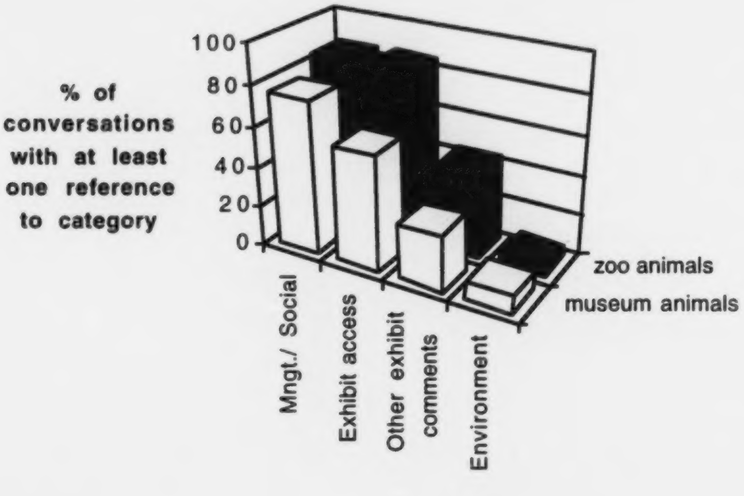


Figure 5.5

Content of conversations of family groups at museum and zoo animals (animal observations)

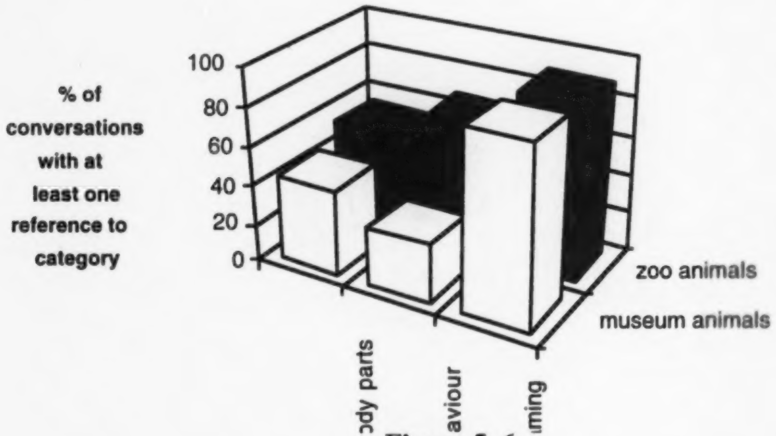
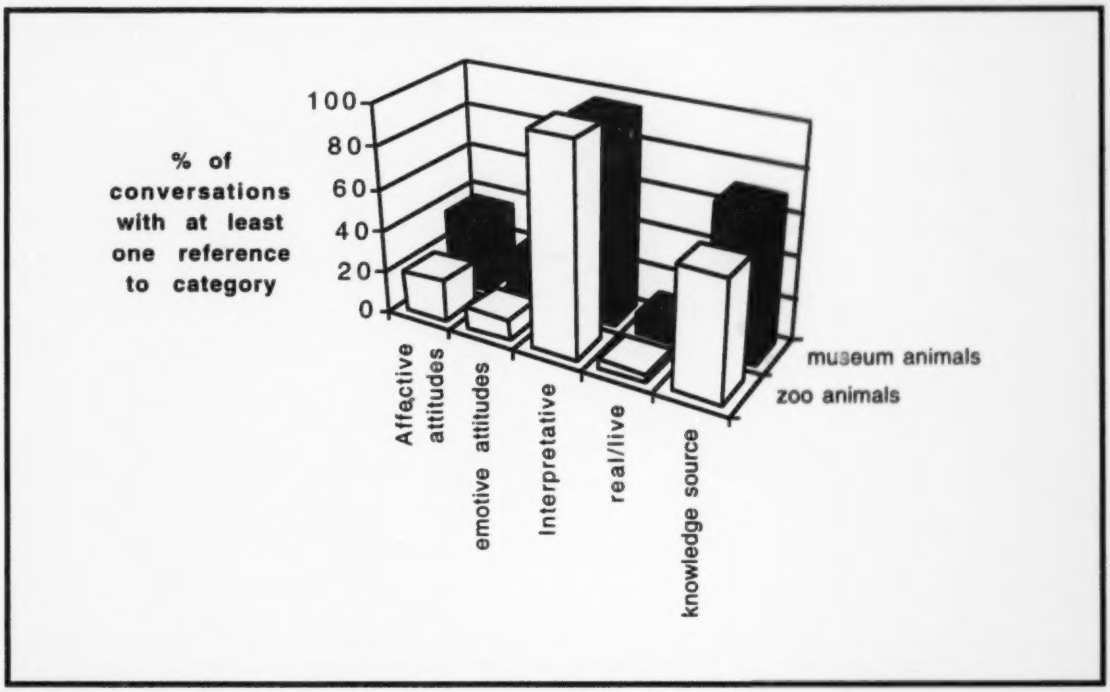


Figure 5. 6

Content of conversations of family groups at museum and zoo animals (narrative content)



The predominance of naming as the major activity in family groups at both museum and zoo animals is shown clearly in Figure 5.5 above. Figure 5.6 (above) shows the significantly higher number of conversations with at least one reference to an affective attitude or a knowledge source that occur in the museum at the preserved animals (Table 5.7).

The data show that the similarity of the number of conversations that were concerned with telling the story of the exhibit by families in the museum and zoo is striking. However, the emergence of comments about the authenticity of the animals and affective attitudes, including emotive ones, and a significantly higher number of incidence within the museum conversations was both unexpected and surprising.

The assumption that the museum 'is for learning', be the groups from school or family, must be questioned as there were no significant differences ($p< .01$ or less), between the knowledge source categories that indicated questions and statements of knowledge. However, at a lower level of significance, ($p< 0.025$) the museum was the site for family knowledge source questions and the zoo the one for more social and management comments.

Family conversations in both zoo and museum showed remarkable similarity to those of school groups in the same locations. The extent to which the museum groups commented about the supposed or predicted behaviour of animals was unexpected, as was the more affective and emotive nature of the museum conversations compared with those of the zoo. A reference to authenticity and environmentally oriented topics in conversations occurred at both sites, but was significantly higher for the school groups within the museum. Visits to animal specimens, alive or preserved, were more of an affective experience for school groups than for families. Thus the idea that the zoo is for leisure-looking, the museum is for learning-looking, whatever category of visitors, family or school, needs using with care. These findings have implications for the design and provision of educational programmes for schools and the families within these establishments.

Summary

The London Zoo and the Natural History Museum form two contrasting locations in which to look at animal specimens of a similar range of varieties. However, there exist some fundamental differences between the two institutions and their product, animal exhibits, which are reflected within the content of the conversations of visitors. Otherwise there is a remarkable similarity in categories that are independent of the variables between the two sites and their exhibits. The specimens within the zoo are of a different type, alive and expected to move, in contrast to those within the museum, dead and expected to be static. Moreover, the museum provided an impressive controlled setting in which to view animal specimens that were clearly displayed, often within a glass case. Such a design of exhibits made the task of locating the specimens far easier than it proved to be in the zoo, where the increasing trend for naturalistic enclosures caused visitors to 'work' harder in locating the animals, using other items in the exhibit as reference points.

The museum exhibits are better suited for close structured study for the animal specimens exhibited by the museum provide a predictable display in which the animal can be located easily and watched, a long as the visitors wishes to do so, in the position in which they have been arranged by the designers. It is somewhat surprising, even though the specimens were static, that about a third of visitors' conversations discussed the 'behaviour' of the static animals. Although the data reflect that observations about animals were a major focus for both groups, in both settings, and school groups commented overall in a similar fashion to families about names, museum groups mentioned the identity and categorisation categories of naming significantly more. However, families compared animals with humans, objects and other animals in the zoo significantly more but conversely school groups compared the animals significantly more in the zoo. Unexpectedly the museum proved to be the most frequent location of affective and emotional comments overall, although schools commented with similar frequency. Families generated significantly more affective comments in the museum, refuting the commonly held perception of zoos as the location of dominant affective comment and it being the province of families. Schools groups generated these in both locations to a significantly greater extent than did families.

The Mathematics and Reading Connection

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A children's rhyme linked the domains of the three Rs: reading, 'riting and 'rithmetic long before the term whole language philosophy or integrated curriculum became a focal point of educators. Letters, symbols, and numbers are the primary methods of communication in the world. This includes the universal sharing of ideas, concepts, data, and information. This common role in society creates a natural connection for the integration of reading and mathematics in the school curriculum.

Success in reading and mathematics is based in process skills that incorporate the integration of contextual information and with prior knowledge to produce meaning. The development of the skills involved in these domains could be considered the four Cs: construction, collaboration, context, and communication. Knowledge is actively constructed in each of these areas. In reading, letters form words that symbolize objects, attributes or action. In mathematics, numbers symbolize amounts, patterns or relationships. These words and numerical expressions create a basis for additional focus or information processing. This knowledge can be constructed and enhanced through collaboration with others in the classroom or workplace. Knowledge is communicated with others to share, compare and assess information.

Which strategies of learning language can be applied to the learning of mathematics?

Jennie Bickmore-Brand (Bickmore-Brand, 1993) identifies seven language learning strategies that can be applied to enhance the learning of mathematics. They include:

- Creating a meaningful and relevant context for the knowledge, skills and values of mathematics.
- Realizing the starting point of interest in mathematics is the knowledge base of the student.
- Providing opportunities for the learner to see the skills, processes and values of mathematics by the teacher's modeling.
- Continuing to build on the knowledge base and challenging the students-scaffolding.
- Facilitating the metacognition of the student by helping the student identify the learning processes and how he or she learns.
- Assisting the learner to accept the responsibility for the construction of knowledge.
- Building a community of learners in a risk-free learning environment.

These strands should be interwoven into the classroom environment to aid in the content, methodology, and assessment in mathematics. Bickmore-Brand suggests that these steps will create a positive association with mathematics and mathematical relevancy in society.

What does the National Council of Teachers of Mathematics say about the interdisciplinary approach of teaching mathematics with reading?

The National Council of Teachers of Mathematics (NCTM, 1989) acknowledged this integration between the domains of mathematics and reading with the inclusion of Standard 2 "Mathematics as Communication" in the *Curriculum and Evaluation Standards for School Mathematics.* The emphasis for the grade groupings follows.

Grades K-4:

- Mathematics can be thought of as a language.
- Reading children's literature about mathematics, and eventually text material, needs more emphasis in the K-4 curriculum.
- Children can meaningfully learn mathematics; teachers can help the process by providing opportunities for them to communicate and to "talk math" with their friends.
- Use connections to construct knowledge, learn alternative ways to think about ideas, clarify thinking, and communicate about problems.

Grades 5-8:

- Use the skills of reading, listening, and viewing to interpret and evaluate mathematical ideas.

Grades 9-10:

- Use of skills provides opportunities for interpretation of data and statistics regarding social issues. In this manner, mathematics helps students develop an understanding of the events in society.

The NCTM also acknowledges this linkage in its other publications. The 1995 Yearbook, *Connecting Mathematics across the Curriculum*, and the 1996 Yearbook, *Communication in Mathematics K-12 and Beyond*,are two examples of such publications. The 1995 yearbook focuses on the connections of mathematics in all areas and all levels of the school curriculum. It specifically addresses the topic for elementary school curriculum in an article by David J. Whitin, "Connecting Literature and Mathematics." This article suggests that children's literature can help students meaningfully connect their world to the the world of mathematical ideas. The 1996 Yearbook focuses on building a discourse community of meaningful mathematical communication within classrooms and beyond. One of the sections for such a changing paradigm is reading. Topics included for discussion are the use of trade books, metaphorical thinking, reading to construct meaning, and communicating mathematics through literature. The NCTM is promoting collaboration of reading and mathematics.

What is the impact of reading on mathematical process and skills?

Reading provides both context and motivation for the mathematics students. Reading from a text book, trade book, or newspaper article can provide the students with a shared basis for receiving and sharing information. Reading can supply a common setting, environment, and details for application of students' mathematical skills. Reading provides an interesting context that students can explore. This exploration can occur either in a group with many students or with one student. In general, the integration of math and reading creates a relevant context for the formal and abstract mathematical processes.

The use of either fiction or non-fiction material can create the context for discussion and set the stage for mathematical skills. The specific areas may include:

- Posing questions in mathematics.
- Sequencing of events in a story.
- Questioning and seeking additional information students would like to know about a topic.
- The development of recording skills.
- Comparison and contrasts. For example, a Venn Diagram can be used to compare and contrast different versions of the same story.
- Construction of charts and graphs to illustrate or determine the impact of details.
- One-to-one correspondence counting.
- Predicting and hypothesizing. For example, looking for patterns in stories like introduction, development of details and theme, climax and conclusion.
- Validating/persuading using data or details to determine and support a particular position.
- Conferring with others to generate new knowledge or to confirm position on a topic.

What is mathematical literacy?

With support for the connections between the strategies, processes, and skills within the domains of reading and mathematics, can an argument be made for mathematical literacy? David Whitin, Heidi Mills and Timothy O'Keefe present an argument for such a concept in *Living and Learning Mathematics, Stories and Strategies for Supporting Mathematical Literacy*. The authors maintain that students become mathematically literate the same way they become literate in reading. Mathematics is more than numbers just as reading is more that letters. Literacy involves placing numbers into meaningful context in daily living. It is demonstrated by students putting numbers to good use within the structure of their lives, their stories and their literature. Students work together, observing and investigating uses of numbers, asking questions, and planning strategies, to find the answers. These are the kinds of activities that can create and support the environment for mathematical literacy.

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CHAPTER 6

ANIMAL ANIMATRONIC EXHIBITS: ZOO-LIKE OR MUSEUM-LIKE?

The nature of an animal specimen, alive or preserved, and the site in which it is displayed, museum or zoo, affect the content of the conversations of visitors. Such comments are concerned with locating the specimens, the features that catch the attention of visitors, the interpretation that they make, in particular the attitudes which a specimen, or series of specimens of similar nature evoke. An interesting question that arises from observing visitors at the animatronic exhibits is whether comments elicited from visitors resembled the pattern and proportions of those that formed the conversations generated museum specimens or was the pattern was more akin to that generated by visitors looking at the living animals in the zoo?

The material reported in Chapters 4 and 5 has established that visitors to animal exhibits talked about the specimens when they were in front of them and that there was an *overall similarity* of content between conversations that were generated, by both school groups and family groups, at both zoo and museum animal specimens. However, the data indicate that there were particular differences in the proportions of comments generated by visitors at the two different types of specimens that reflect of the nature of the exhibits being discussed. For example, at the preserved animals there were, not unexpectedly, significantly fewer comments about behaviour and museum visitors overall generated more affective comments (55% compared with 32% for zoo visitors, data from Tables 2 and 5 (zoo), 3 and 15 (museum) in Appendix 2.2). Furthermore, the data presented in Chapters 4 and 5 showed that the *place*, museum or zoo, where the animal specimens were displayed also exerted an apparent effect on the content of conversations of the visitors and reflected the ease with which the specimens could be seen (see exhibit access category) and that museums elicited more knowledge source comments but fewer management/social ones than did zoos. Such findings reinforce the assumption in the literature that, although families do have a social agenda for a museum visit, the original purpose of the museum of disseminating information to its audience does occur (Wolins 1989).

The data in Chapter 4 derived from the analysis of the content of conversations generated in front of zoo animals and that for animals seen on a farm and the subsequent, but separate, comparison of both sets of data with that obtained at animated models, show that when an animal *was* exhibited, the visitors focused more on salient parts. In contrast, when the animal was available to be looked at, but was not exhibited, the conversations had a distinct affective and emotive emphasis. The inanimate models, displayed in museum style, were exhibits *designed* for the visitors and possessed the visual cue of movement which led many visitors to question whether the models were alive. Therefore it is appropriate to compare the two sets of data, preserved specimens and live specimens, for each group of visitors in terms of their visit rationale, school or family, to ascertain whether the conversations engendered at animatronic specimens are more museum-like or zoo-like in the responses that are elicited by them.

However, it is salutary to bear in mind that, whilst the effect on the conversations of visitors of the nature of the exhibits, live, and animated model, can be assessed, the animatronics were replicas of extinct species of which there were only three kinds exhibited and only two species were named. Therefore, it would be unlikely that visitors would refer to the animal specimens by name to the same that they did at the other types of specimens. Had there been a comparable number of different species of dinosaur on display the number of naming comments would probably have been similar to that observed at the wide variety of live and preserved animal specimens.

Particular issues for which answers are sought are:

- whether the pattern of conversations at the animatronics is similar to that at the static exhibits in the same museum, or to that of the live animal exhibits;
- whether there is a similarity between the comments of both groups of visitors, family and school, at the static animals and at the animated models?
- whether the issues of reality and causality of exhibits are important to the visitors.

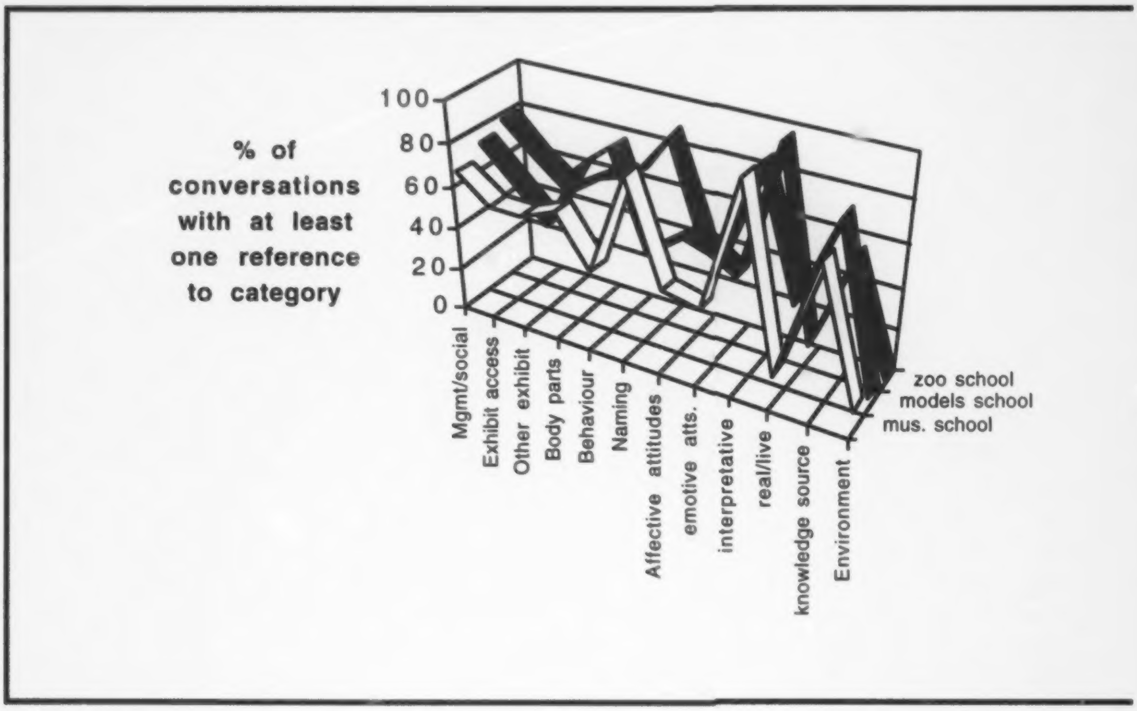
This chapter will not present all the pairwise comparisons that it is possible to make. The data exist in the tables of Chapters 4 and 5 for an interested reader to do so. This chapter will present the data according to the group which generated them and the exhibit type at which the conversations were made and provide an overview of the data derived from the analysis of the content of conversations generated at animal exhibits.

6.1 SCHOOL GROUPS

The comparison of the data for the content of the conversations of school groups shown in Figure 6.1 shows that the animatronic models elicited more comments about body parts, affective and emotive attitudes, and the authenticity (real/live category) than did the other two types of specimen.

Figure 6.1

Content of conversations generated by school groups at the models compared with that of groups at museum and zoo animals



The conversational content was similar to that generated by school groups at animal exhibits in zoos in the categories of management/social, exhibit access, interpretative and environmental comments. Significantly more comments about other exhibit comments ($p< 0.01$ χ_1^2 6.34), body parts, behaviour, emotive attitudes, authenticity, and knowledge source comments and, as expected, fewer naming comments than those of the school visitors to the zoo animals were generated at the animatronics. Management/social categories were higher for family groups than for school groups and highest in the zoo for both groups and lowest at the museum specimens, indicating an influence of the site on both groups in the zoo and the museum

Figure 6.1 shows that the animatronics elicited similar proportions of responses from school groups at preserved specimens about exhibit access but fewer comments about other aspects of the exhibit. Knowledge source comments generated at both the preserved specimens and animatronics were of similar proportions, reflecting the 'museum' effect, noted by a number of researchers such as Linton and Young (1992) and Clarke and Miles (1980) that museums are for learning, on the school groups. The school groups generated similar numbers of comments at least once in conversations at both animatronic models and the preserved specimens in exhibit access and interpretative comments.

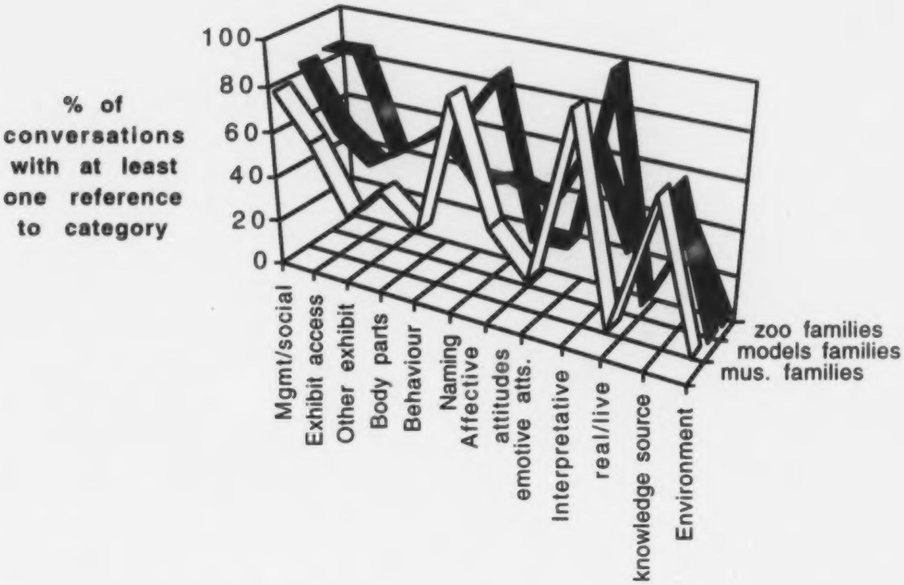
6.2 FAMILY GROUPS

The data presented in Figure 6.2 (below) show that the number of comments about a category that were generated by families at animatronic models are similar to those of families at preserved specimens in the categories of exhibit access, knowledge source comments.

Figure 6.2 shows that family groups at the animatronic models generated significantly more affective attitudes (χ_1^2 36.49, $p << 0.005$) and more emotive attitudes (χ_1^2 67.79 $p << 0.005$) than they did at the other two models, but significantly fewer interpretative comments (χ_1^2 55.42 $p << 0.005$), probably because the dramatic nature of the exhibits overawed the groups who interpreted what they saw less. Full data are presented in Tables 2, 3, 4, 13, 14, 15 of Appendix 2b. Families, similarly to school groups, generated significantly fewer naming comments but similar numbers of comments at all three types of specimens in the categories of management/social, body parts and environment.

Figure 6.2

Content of conversations of family groups at animatronic compared with that of groups at museum and zoo exhibits



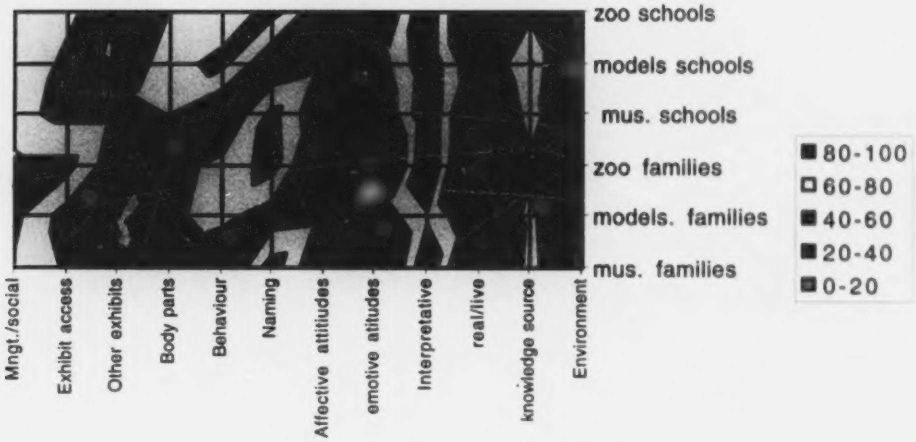
In a similar manner to school groups, families commented about the salient features displayed by the animatronics. These models were more like the zoo animals in the higher numbers of comments they elicited but shared some of the features inherent in museum exhibits, such as ease of access for people unfamiliar with the exhibits and the elicitation of comments that were concerned with giving and asking for information that is a feature of museum visits (knowledge source comments).

6.3 COMPARISONS OF CONTENT OF CONVERSATIONS OF ALL GROUPS AT ALL TYPES OF SPECIMENS

The animated models are anomalous. On the one hand they provide visual clues that are shared with live animals, or expected to be seen in live animals, movement and generating vocal sounds, but the animated dinosaurs do not locomote, they only move parts of their bodies. On the other hand, the dinosaurs are exhibited within the museum, which, as discussed in Appendix 2a, is a cathedral-like building and such physical aspects of the site do influence the conversational content. Furthermore, the animated dinosaur models portray images of unfamiliar animals, whereas the visitors do possess some familiarity with the overall types of museum animal specimens, even if not the species or genus, displayed.

Figure 6.3

Topographical chart to show comparisons of content of conversations of all groups at all types of animal exhibits



The data shown in Figure 6.3 show that the animatronics elicited a pattern of conversational comment that was similar to that of all groups at zoo animals in terms of the parts of the body commented upon. However, the animatronics engendered significantly more knowledge source comments than zoo groups and than museum school groups but a similar number to those mentioned by families. Family groups mentioned management and social comments similarly but amongst school groups the number of comments generated by groups at animatronics is similar to those of the zoo but more than those groups at the preserved specimens. The similarity of the numbers of management/social comments, which were higher than those for the school groups reflects the predominant leisure focus of the family in the way in which they progress and talk in a museum visit (Leitcher, Hensel and Larson 1989) and the lower occurrence of knowledge source comments within the zoo, for both schools and families, reflects a tendency for museum visitors to exchange and seek information more in a museum rather than a zoo.

The response engendered by the animatronics from visitors was similar to that found in the conversational content of visitors at zoo animals about observations of body parts and behaviour. However, the nature of the location of the animatronic exhibits, the museum, where the exhibit has been designed for visitors, is reflected in the pattern of comments in the areas such as knowledge source and exhibit access that are influenced by these other factors different from either of the other two types of specimen. The paucity of species is a reflection of the overall exhibit design and is reflected in the conversational content. All groups generated more affective, including emotive comments, at the animatronics than they did at the other types of animal exhibits. The numbers of affective comments for families was similar to that of families at preserved specimens. The animatronic exhibits elicited other exhibit comments for school groups less than both other types of specimens but more like the families at zoo animals than the preserved ones.

Animatronics accentuated particular aspects of animals that school visitors commented about when looking at animals, but both the location of the exhibits and the way in which animatronics are exhibited, engendered more knowledge source comments. Furthermore, the ease with which the salient features could be seen in the museum-style exhibits and the movements associated with these features, resulted in a significantly higher number of references with conversations to them.

The animatronics elicited a much higher number of emotive and ‘real/live comments and a low number of naming comments. The emotive and authenticity comments are associated with the stories of the exhibits and the low number of naming comments is because there were only three species, two of which were named. The animatronic nature of the specimens and the design of the exhibits appears to have highlighted the emotive and authentic aspects of the displays about which the visitors commented. The visitors noticed the story that the exhibits were telling and gave affective responses and the effectiveness of the animatronics elicited comments about the authenticity of the models.

The answer to the question posed by the title of this chapter is that the animatronics are more like zoo specimens than traditional museum ones in the pattern of responses about animal observations that are generated at them, but, because of the design of the models and their exhibit, with the visitor and the story line the designers want to tell, and the permanent nature of the behaviours incorporated into the exhibit, animatronics share some features with preserved specimens, such as the ease with which the specimens can be seen. The use of animatronics in exhibits was powerful in engaging the attention of visitors. Such exhibits engendered far higher affective and emotive responses from the visitors well as more animal observations (other than naming because of the lack of variety of species on display) than did the other types of specimens. The nature of the models prompted visitors to discuss reality and causality. Animatronics are a novel but apparently powerful tool in the repertoire of exhibit designers and educators because they can show effectively the behaviours and associated body parts which the designers and educators want to bring to the attention of their visitors.

Summary

The data show clearly that the animated models are superior in conveying a message explicit within an exhibit to visitors but that, not unexpectedly, the traditional Natural History Museum specimens and live animals elicited more comments about naming, a basis for studying biodiversity. The two types of museum exhibits are powerful in providing specific messages about different aspects of animals but the message about the animal structure and behaviour that are commented about at the animatronics are more akin, but accentuated in proportions, to those of the live animals.

CHAPTER 7

PUPILS, CHAPERONES AND TEACHERS

This chapter will consider whether the type of group within the school party, pupils-only, chaperone and pupils, or teacher and pupils, affects the content of the conversations generated whilst the visitors look at animal specimens. Previous chapters have shown that, although overall there is a similarity in the content of conversations at animal exhibits, both the effect of the type of exhibit and the site in which they are viewed affect the proportions of the conversations of visitors. Moreover, Chapters 4, 5 and 6 have shown that the conversational content is also influenced by the rationale for the visit, whether it is undertaken within a formal education framework, as school groups, or whether it is a family leisure oriented context. There are two main influences that may affect the content of the conversation within the context of a school visit:

- the presence of adults within the group;
- the status of the adult, whether they are a teacher or whether a 'helper' or chaperone, who is moreover, often a parent of one of the pupils in their group.

This chapter explores:

- whether the above factors do influence the conversational of the school groups and, if so, the extent;
- whether the content of the conversations of chaperoned groups reflects that of family groups. Their comments may be similar in content to those of family groups, or may reflect more closely those of teacher-groups, depending on the emphasis which the adults makes in the conversations. Such information is important because the pupils are visiting the exhibits as part of their formal educational entitlement

> and would expect to be taught salient points relevant to their school work from the exhibits, not be part of a socially oriented conversation.

The perceived role and status of accompanying adults are likely to be important factors in influencing the content of the conversations of school groups during museum, zoo and farm visits, for their dialogue can focus the attention of the pupils on to specific aspects of the exhibits. Comments are the outward evidence of interest (Falk and Dierking 1992:100), but those of the three subgroups of a school party, pupils alone, chaperones and pupils, and teachers and pupils, may vary, reflecting a different focus of interest for each group, although both adult-groups should have a similar educational focus because their groups have the same educational goals, that of the school visit. This chapter will show whether there are significant differences in the content of the conversations of such groups, and if so, whether the conversations of certain groups offer greater opportunities for biological observations about animals.

The pupils within a school party were from the same year group and often belonged to the same school class. As the pupils in all these groups were from a similar background, the main variable that could have affected the topic of conversation at one location, other than the type of animal, was *the absence or presence of an adult* . It was likely that the content of conversations of the three distinct subgroups of school parties would vary according to whether there was, or was not, an adult interacting with the group. A secondary consideration was the status of the accompanying adult, who may have been a chaperone *or* a teacher from the pupils' school. This chapter is focused on comparing data from these three groups at the same exhibits.

7.1 COMPARISON OF CONTENT OF CONVERSATIONS OF SUBGROUPS WITHIN SCHOOL PARTIES

7. 1.1 Conversations of school groups at zoo animals

The data presented in Table 7.1 show that there were few significant differences in the content of conversations at the zoo of the three constituent groups of the school parties except for the categories of management/social, knowledge source and body parts.

Table 7. 1

Comparison of main comments in conversations of subordinate groups of school parties at zoo animals (main categories

Category	School groups n = 459 no	%	Pupils-only n = 235 no	%	With chaperones n = 91 no	%	With teachers n = 133 no	%	χ_2^2 (totals of sub-groups)	Probability	Phi²
Mngt/social	354	77	171	73	91	100	111	84	32.55*	$p<0.005$	0.07
Exhibit access	289	63	143	61	62	68	84	63	1.49		
Other exhibit comments	227	50	110	47	43	47	74	56	2.87		
Body parts	280	61	130	55	55	60	95	71	9.28	$p<0.01$	0.02
Behaviour	301	66	141	60	63	69	97	73	6.96		
Names	401	87	203	86	80	88	117	88	0.25		
Affective atts	193	42	96	41	38	42	59	44	0.43		
emotive	143	31	67	29	28	31	48	36	2.28		
Interpretative comments	443	97	225	96	91	100	127	96	N/A		
real/alive	41	9	28	12	6	7	7	5	5.38		
knowledge source	254	55	110	47	55	60	89	67	15.09	$p<0.005$	0.02
Environment	19	4	7	3	7	8	4	3	N/A		

Both adult-containing groups generated knowledge source comments to the same extent (χ_2^2 0.99), but significantly more than did the pupil-only groups, indicating that the adults were drawing the pupils' attention to items. However, it was the teacher-groups who commented the most on body parts and the chaperone-groups which generated significantly more management and social comments.

Table 7. 2

Comparison of main comment in conversations of subordinate social categories of school parties at zoo animals (animal observations)

Category	School group n = 459		Pupils-only n = 235		With chaperones n = 91		With teachers n = 133		χ_2^2 (sub groups totals)	Probab -ility	Phi^2
	no	%	no	%	no	%	no	%			
Body Parts	280	61	130	55	55	60	95	71	9.28	$p<0.01$	0.02
front end	77	18	29	12	20	22	28	21	6.82		
dimensions	237	52	106	45	45	50	86	65	13.22	$p<.005$	0.03
unfamiliar	32	7	10	4	5	6	17	13	N/A		
disrupters	57	12	32	14	12	13	13	10	1.21		
Behaviour	301	66	141	60	63	69	97	73	6.96		
movement	130	28	59	25	28	31	43	32	2.52		
feeding	54	12	21	9	15	17	18	14	4.16		
position	177	39	78	33	32	35	67	50	11.14	$p<0.005$	0.02
attractors	115	25	54	22	23	25	38	29	1.42		
Names	401	87	203	86	80	88	117	88	0.25		
identity	318	69	158	67	60	66	90	68	0.08		
category	220	48	114	49	42	46	64	48	0.15		
compare	180	39	87	37	35	39	58	44	1.57		
mistake	33	7	17	7	9	10	9	7	0.85		

The data set out in Table 7.2 shows the striking similarity between the number of conversations referring at least once to direct animal observations because there are few significant differences in the numbers of conversations containing at least one comment of a category. However, the data highlight that teacher-groups commented significantly more about the dimensions and the position of the animal. It is likely that reference to the position of an animal, combined with ostensive movements, was used as a locator to explain the whereabouts of the specimen to another member of the group. Examination of the transcripts shows that the comments frequently combined a reference to position with an ostensive remark. For example an eight year old girl remarked to her friend, 'There is a rhino, right ahead of us', and a teacher with seven year old pupils at the tiger enclosure said, 'Look, there it is, just under the bridges'.

The data reveal that the presence of a teacher with a group of pupils on a visit to the zoo provided the content of the conversations of the group with an emphasis in a few topic areas- management/social, knowledge source and overall body parts and dimensions and positions, but if teachers were teaching pupils about the animals, in terms of the National Curriculum requirements, a greater number of significantly different results for the teacher-groups would have been expected. The data of chaperones and pupil-only groups were alike. This finding suggests that there exists a 'basic' or everyday pattern of comments that is generated at live animal exhibits by individuals which is altered (but not substantially), when there is a definite educational objective. The lack of a similar focus in the content of the chaperone groups is perplexing and suggests that they did not share the objectives for looking at these particular aspects of the exhibits as did the teacher-groups. Furthermore, the data (Appendix 2: Tables 2, 3 and 4) indicate that both groups with adults both questioned or pronounced opinions more than did pupil-only groups. Chaperone-groups generated significantly more management/social comments. However, the presence of the teacher caused only a little more emphasis within conversations to be placed on certain observations than were mentioned by pupils-only and chaperone groups.

7.1.2 Conversations of school groups at farm animals

It is interesting to consider whether the content of the conversations generated within the three subgroups of a school party whilst looking at live, but not exhibited, animals i.e. farm animals, varied and, if they did, can differences that were a result of the different nature of the animal, i.e. as an exhibit/not an exhibit, be identified?

The data for conversations generated at farm animals are presented in Tables 7.3 and 7.4. One surprising finding from the data in Table 7.3 was that at the farm, unlike the situation found within the zoo data (Tables 7.1 and 7.2), the groups in which a teacher was a member generated significantly more comments that were either management or social in nature. It must however, be borne in mind that within the 'social' category, the transcripts show that the majority of references were to the use of the pupils' names and acknowledgement of a response which were part of the animal focused dialogue, which would increase the number of conversations with comments in the category.

Table 7.3

Comparison of comments in conversations generated on the farm, arranged according to social groups of school parties (main categories)

Category	Total		Pupils-only		With chaperones		With teachers		χ_2^2	Probability	Phi^2
	n = 248		n = 163		n = 68		n = 17		σsubgroup totals		
	no	%	no	%	no	%	no	%			
Mngt./social	175	71	111	68	48	71	16	94	127.99	$p<<0.005$	0.52
Exhibit access	96	39	72	44	18	27	6	35	6.43		
Other exhibit	91	37	54	33	26	38	11	65	6.70		
Body parts	139	56	90	55	37	54	12	71	1.58		
Behaviour	129	52	82	50	36	53	11	65	1.31		
Naming	105	42	69	42	28	41	8	47	0.19		
Affective atts	153	62	91	56	49	72	13	77	7.03		
emotive	113	46	72	44	31	46	10	59	1.33		
Interpretative	196	79	120	74	60	88	16	94	8.69		
knowledge	127	51	70	43	44	65	13	77	13.76	$p<0.005$	0.06
Environment	1	0	0	0	0	0	1	0	N/A		

The data indicate that all conversations included some reference to the animals whilst the groups were in front of the animal (Appendix 2.2 Table 16). It was the chaperone-groups, not pupil-only groups, as zoo educators and teachers intuitively anticipate, who generated significantly more conversations with at least one affective attitude comment and emotive comments were generated equally by all groups at live farm animals. The majority of the teacher-groups, unlike the same category in other locations, contained a lecturer from the institution, the farm, who directed the attention of the group. If the groups were visiting the farm to learn about particular aspects of farm animals it would have been expected that the teacher-groups in particular would focus on the topic of the task drawing attention to the behaviour and body parts. Moreover, such focusing would be expected to be reflected in a higher number of conversations referring to the topic.

The data from Table 7.3 show that there were no statistically significant differences observed between the rates of knowledge source comments for the chaperone-groups and the teacher-groups (χ_1^2 1.12) and the lowest number of conversations with knowledge comments were found amongst the pupil-only group, a phenomenon also observed within the zoo data. The adult-groups were generating questions and making statements of knowledge source, which suggests that adults were focusing pupils' attention on animals to some extent.

Table 7.4

Comparison of content of conversations generated on a farm and arranged according to the social subgroups of school parties (animal observations)

Category	Total		Pupils-only		With chaperones		With teachers		χ_2^2 subgroup totals	Proba-bility	Phi²
	n=248		n=163		n=68		n=17				
	no	%	no	%	no	%	no	%			
Body parts	139	56	90	55	37	54	12	71	1.58		
front end	46	19	28	17	17	25	1	6	3.88		
dimensions	100	40	65	40	25	37	10	59	2.79		
unfamiliar	32	13	24	15	6	9	2	12	1.51		
disrupters	7	3	5	3	1	2	1	6	N/A		
Behaviour	129	52	82	50	36	53	11	65	1.31		
position	34	14	23	14	9	13	2	12	0.09		
movement	29	12	19	12	7	10	3	18	0.71		
feeding	43	17	24	15	16	24	3	18	2.60		
attractors	60	24	44	27	10	15	6	35	5.18		
Naming	105	42	69	42	28	41	8	47	0.19		
identity	89	36	56	34	26	38	7	41	0.54		
category	82	33	49	30	25	37	8	47	2.59		
compare	26	11	18	11	5	7	3	18	1.69		
mistake	2	1	0	0	2	3	0	0	N/A		

Table 7.4 shows that no one group commented significantly more about any animal focused category. However, the data (Table 7.4) suggest that, irrespective of the curricular focus for the visit, *all* the groups looked and commented upon similar aspects of the farm animals which is surprising as the school groups did not share similar educational topics. Although several of the schools were visiting the farm with an educational emphasis on science and technology, one group was studying agriculture in their history topic and had visited the agricultural museum at Reading University in the morning before their farm visit. The focus for the visit had no apparent affect on the content of conversations.

As has been identified in Tables 4.10 and 4.11 in Chapter 4, the similarity of the content of conversations about body parts from those generated during farm visits to that of the 'zoo' conversations is striking. This finding should be cause for concern for zoos who, unlike the farm where the data was collected, have an active educational mission. The effect of a farm visit *is* mainly an affective experience. Affective comments form overall the highest category of comments after management/social and interpretative. However, unlike the zoo visit, the teacher-groups attended more to body parts of animals than was the case within the conversations generated by other groups during their farm visit. Such a result indicates that there is a basis for developing observational work and a promising potential for developing farms as sites for educational visits with a focus on biology. It would seem appropriate that pupils could visit farms to learn to observe animals and their overall characteristics so that, when they visit a zoo, they could use the skills acquired and notice salient features of the exotic animals rather than the main features of animals in general.

7.1.3 Conversations of school groups at museum animals

To what extent does the presence of an adult affect the content of the conversations of school groups within the museum looking at the static, preserved animal specimens?

Table 7.5

Comparison of content of conversations generated by the three subgroups of the school parties at museum animals (main categories)

Category	School groups n=407		Pupils-only n=176		With chaperone n=116		With teacher n=115		χ_2^2 sub totals	Probability	Phi^2
	no	%	no	%	no	%	no	%			
Mngt./social	270	66	108	61	69	60	93	81	15.27	$p < 0.005$	0.04
Exhibit access	219	54	89	51	56	48	74	64	7.31		
Other exhibit	220	54	87	49	66	57	67	58	2.71		
Body parts	243	60	98	56	77	66	74	64	4.05		
Behaviour	152	37	45	26	52	45	55	48	18.61	$p<0.005$	0.05
Naming	344	85	141	80	102	88	101	88	4.60		
Affective atts	158	39	74	42	42	36	42	37	1.36		
emotive	145	36	65	37	42	36	38	33	0.48		
Interpretative	395	97	166	94	114	98	115	100	8.70		
knowledge	296	73	113	64	83	72	100	87	18.27	$p<0.005$	0.05
real/alive	46	11	29	17	20	17	16	14	0.54		
Environment	45	11	13	7	9	8	23	20	13.05	$p<0.005$	0.03

The data in Table 7.5 show that the teacher-groups generated significantly more comments in the following categories: management/social, knowledge source, environment.

Pupils-only groups commented on behaviours and generated knowledge source remarks significantly less. The presence of an adult, when the adult was a teacher, *does* affect the content of the conversations at the traditional animal specimens, significantly more knowledge source comments were heard. Within the museum, the groups of pupils *without* an accompanying adult, commented less overall about behaviour of the animals than did groups containing an adult. This observation suggests that both categories of adults influenced conversations concerning behaviours that *would* be seen if the animals were alive but that groups containing a school teacher generated the most of such comments. The number of conversations with at least one affective attitude comment were similar, which is surprising as teachers and museum educators are also tacitly of the opinion that pupils generated more of such comments than did groups with adults.

Table 7. 6

Comparison of content of conversations generated at museum animals by the three subgroups of the school parties (animal observations)

Category	School groups n=407		Pupils-only n=176		With chaperones n=116		With teacher n=115		χ_2^2 sub total	Probab-ility	Phi^2
	no	%	no	%	no	%	no	%			
Animal obs.	405	99	174	99	116	100	115	100	N/A		
Body parts	243	60	98	56	77	66	74	64	4.05		
front end	67	17	25	14	25	22	17	15	3.07		
dimensions	198	47	76	43	67	58	55	48	5.99		
unfamiliar	67	17	26	15	20	17	21	18	0.69		
disrupters	39	10	15	9	18	16	6	5	7.47	p<0.01	0.02
Behaviour	152	37	45	26	52	45	55	49	18.61	p<0.005	50.05
position	69	17	22	13	27	23	20	17	5.79		
movement	40	10	12	7	12	10	16	14	4.00		
feeding	18	4	6	3	7	6	15	13	N/A		
attractors	63	16	18	10	15	13	27	24	10.14	p<0.01	0.02
Naming	344	85	141	80	102	88	101	88	4.60		
identity	297	73	122	69	89	77	68	59	8.38		
category	232	57	95	54	74	64	64	56	2.66		
compare	164	40	43	24	83	72	38	33	68.03	p<<0.005	0.17
mistake	23	6	12	7	7	6	4	4	1.50		

Table 7.6 shows, within each subcategory of behaviour, the only category that showed a significant difference between the number of conversations containing a behaviour reference was that of 'attractors'. The teacher-groups generated significantly more conversations with at least one reference to 'attractors' and these probably were made by the teachers because the pupils-only groups contained less than half as many such references. For example, in the panda conversations, which are reported in Chapter 5, a teacher and pupils referred to the behaviour of the static, preserved animal as if it were alive. In response to the teacher's question about the reason for bamboo in the exhibit, a boy said 'Because that's what he *eats*.'. A teacher provided information about snakes for her group of pupils, 'Well, they *eat* their prey whole'.

A number of the exhibits had interpretative material, including action models, to strengthen the message that the designers wished to purvey. A chaperone directed the following conversation with year 5 girl and provided a narrative, probably obtaining her information from both the label and direct observations of the working model, about the authentic behaviour of barnacles:

> Girl: What's this?
> Adult: They're the legs.
> Girl 2: Miss, what's inside?
> Adult: It uses its legs like a net to catch its food.
> Girl 2: Miss, what's inside?
> Adult: The animal.
> Girl 2: Oh.

Although 'naming' comments were heard at least once in a similar number of conversations, it is striking, as Table 7.6 shows, that chaperone-groups compared the animals with the self and other recalled animals more than did the other two groups.

The visit to the museum elicited some particular trends within the pattern of conversational content. Firstly, all groups that observed the traditional specimens mentioned environmental topics, conservation and natural habitat, more than the groups viewing other types of specimens (Appendix 2 Tables 2, 3 and 4). However, teacher-groups generated significantly more conversations about the environment than the other two groups, but all constituent groups visiting the museum to view the traditional exhibits mentioned this category more so than similar groups in the zoo.

Secondly, chaperone-groups engendered significantly more conversations that contained at least one reference to comparing animals with the self, other animals and inanimates than did the other two groups (Table 7.2, 7.4 and 7.6). It is likely that chaperones felt that such a topic was a conversational input that they could make, based on first hand observations, rather than calling on a repertoire of previous knowledge that they perceived to be possessed by teachers. Thirdly, contrary to the situation amongst zoo groups, (Tables 7.1 and 7.2), where the presence of an adult focused the attention of the groups upon the body parts, rates of reference in the museum to both body parts and using a name were similar amongst all the subgroups of the school party. Lastly, it is interesting to note that, unlike the content of farm-based conversations, but similar to those of the zoo, the generation of affective attitudes was similar across all groups.

In conclusion, the similarity of the conversational content amongst all subgroups of school parties visiting the Natural History Museum to view preserved animal specimens is striking, suggesting that the site and the nature of the exhibits engenders similar types of comments amongst school visitors. The presence of an adult with the school children steered the conversational content towards a discussion of behaviour of the animal and discussion of the 'realness' of the specimens. However, it would be expected that the presence of a teacher, compared with those for chaperones and especially of pupils alone, would have led to significantly different rates of conversations in areas about which the pupils were learning. This was not the case, and leads us to question the effectiveness of the teaching or reappraise the pre-visit preparation of all the school groups.

7.1.4 Conversations of school groups at animatronic models

Previous discussion in Chapters 4 and 6 concerning the animated models has shown that the overall number of conversations, with at least one comment about aspects of the exhibits and attributes of the specimens, are higher at the animated models than at either the live or preserved specimens, for both school and family groups. I have also suggested in Chapter 6 that the sequenced planned actions of the models focus the attention of visitors, both school and family, on the aspects of the animal specimens which are integral to the story that the exhibit designers want to tell, in the case of the diorama the claws, teeth and heads of the predators and the head and tail movements of the dying prey. The presentation of dinosaur exhibits that are not 'fleshless bones' had not occurred before in a permanent exhibition and this novelty effect may have influenced some of the conversational content of the groups at the dinosaurs. This section considers whether all the groups within school parties react in a similar fashion to the animated dinosaur models or whether the focus of the conversations may be particular to certain social groups and the presence of an adult.

The occurrence of only one significant variation in the data in Table 7.7 shows that there is a remarkable similarity within the conversational content of the three subgroups of the school party except chaperone-groups mentioned 'other aspects of the exhibits' far less. The chaperones may not be aware of the emphasis that could be given to other exhibit features and which could contribute to the educational task which is expected to be followed during the visit.

Table 7.7

Comparison of content of conversations generated at animated models by the three subgroups within school parties (main categories)

Category	School groups n=422 no	%	Pupils-only n=175 no	%	With chaperone n=113 no	%	With teacher n=134 no	%	χ_2^2 subtotal	Probab-ility	Phi^2
Mngt./social	304	72	122	70	83	74	98	73	0.65		
Exhibit access	239	57	105	60	63	56	71	53	1.57		
Other exhibit	173	41	82	47	22	20	69	52	44.60	p<<0.005	0.11
Body parts	309	73	126	72	78	69	103	77	1.98		
Behaviour	363	86	146	83	95	84	121	90	3.31		
Naming	176	42	61	35	54	48	61	46	4.36		
Affective atts.	229	63	99	57	62	54	68	51	1.06		
emotive	199	47	91	57	57	50	51	38	6.59		
Interpretative	400	95	164	94	105	93	131	98	3.94		
knowledge	339	80	134	77	89	79	116	87	5.04		
real/alive	170	40	70	40	30	27	70	52	16.83	p<0.005	0.04
Environment	19	5	0	0	8	7	11	8	N/A		

The data shown in Table 7.8 show that teacher-groups comment significantly more on behaviour that attracts attention. The moving of particular body parts is the usual source of attraction. An example of a teacher-child conversation about salient parts is reproduced below. The exchange is with a group of year 2 pupils:

Boy: Look at the daddy one.
Teacher: What daddy one?
Boy: I don't know what sex they are, whether they are men or women.
Girl: The big one's moving.
Boy: Where's the Daddy?
Teacher: Yes the big one is moving; its legs are moving, but the one at the back is eating off its back, see? If you come and move you can see it.

The data in Table 7.8 reveal that the presence of a teacher generated significantly more comment about the dimensions of the animals and the behaviours which attract, the interaction of the predators with prey and the breathing and eye movements of the sleeping solitary model. Teacher-groups both provided a name (an identity) for the models and allocated them to a category (dinosaur, plant-eater, meat-eater, but never reptile).

Table 7.8

Content of conversations generated at animated models by the three social subgroups of school parties (animal observations)

Category	All conversations n=422		Pupils- only n=175		With chaperones n=113		With teachers n=134		χ_2^2 subgroup total	Probab -ility	Phi^2
	no	%	no	%	no	%	no	%			
Animal obs.	422	100	175	100	113	100	134	100	N/A		
Body parts	309	73	126	72	78	69	105	78	2.95		
front end	113	27	46	26	27	24	40	30	1.15		
dimensions	173	41	62	35	41	36	70	52	10.28	$p<0.01$	0.02
unfamiliar	59	14	27	15	16	14	16	12	0.77		
disrupters	162	38	63	36	40	35	59	44	2.65		
Behaviour	363	66	146	83	95	84	121	90	3.37		
position	80	19	34	19	23	20	23	17	0.45		
movement	249	59	105	60	60	53	84	63	2.45		
feeding	127	30	47	27	36	32	44	33	1.52		
attractors	182	43	62	35	48	43	72	54	10.39	$p<0.01$	0.02
Naming	176	42	61	35	54	48	61	46	5.90		
identity	147	35	47	27	24	21	76	57	42.37	$p<<0.005$	0.10
category	85	20	28	16	11	10	46	34	26.24	$p<0.005$	0.06
compare	41	10	16	9	8	7	17	13	2.31		
mistake	6	1	00	00	00	00	6	5	N/A		

This emphasis on identity and category is illustrated in the following exchange:

> Teacher: Carlton, how can you tell if it is a meat-eater or a plant-eater?
> Boy: Because it hasn't got sharp teeth.
> Boy 2: Is it a *Stegosaurus*?
> Teacher: It is a *Terontosaurus*, I think you are going along the right lines.

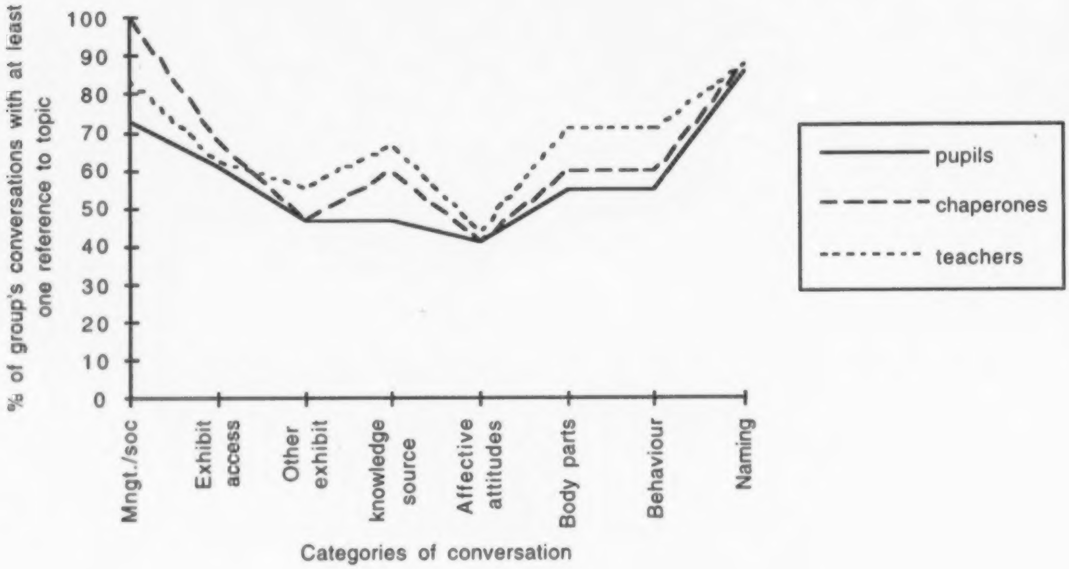
If the pupils were making critical observations needed for their learning it would be expected that the content of conversations of the school groups would have an emphasis on certain aspects of the displays and the interpretation of them. Such an emphasis was not apparent in family and non-teacher school groups.

7.1.5 Overview of the conversational content of the three constituent groups within a school party at the four types of animal specimen

A summary of the main categories of data of conversations generated by the three sub-groups of school visitors at each different type of animal specimen is presented in Figures 7.1 to 7.4. The data show that generally the teacher groups generated most comments, followed by the chaperone-groups with pupils-only groups making least and that the patterns of the proportions of comments are similar, most comments being about management and social aspects or animal focused categories.

Figure 7.1

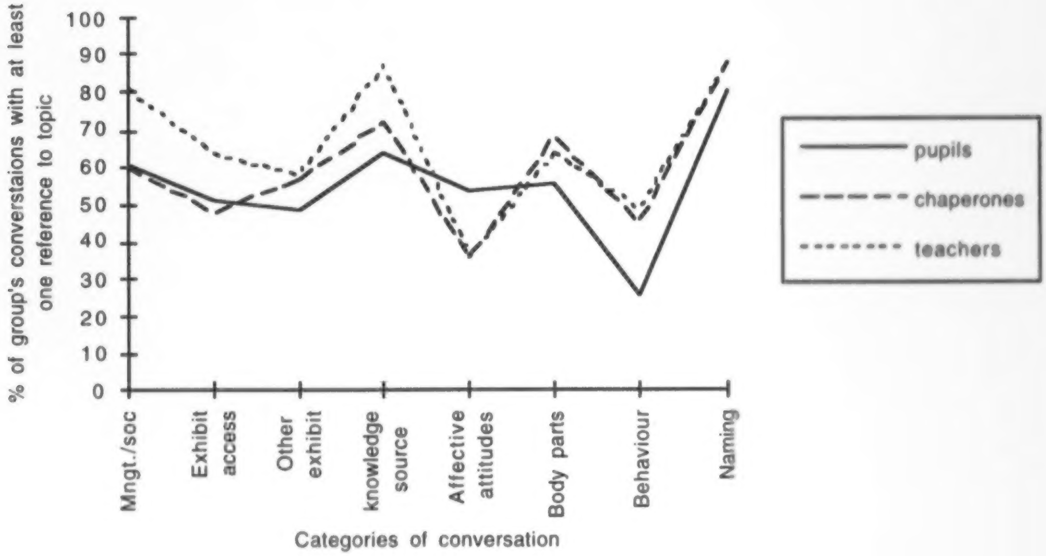
Frequency polygon for main categories of conversational content for the three subgroups of pupils-only, chaperone-groups and teacher-groups at zoo animals



The data presented in Figure 7.1 summarise and present in a more visual manner the data contained in Table 7.1 and highlight that it is the chaperone-groups at the zoo which generate significantly more management/social comments and that they also commented less on behaviour. Teacher-groups commented significantly more on body parts and both adult groups on knowledge sources.

Figure 7.2

Frequency polygon for main categories of conversational content for the three subgroups, pupils-only, chaperone-groups and teacher-groups at museum animals



Data presented in Figure 7.2 (derived from Table 7.6) for the groups looking at the preserved animal specimens within the museum, illustrate that pupils-groups generated fewer comments than did the adult groups, of which the teacher-groups produced significantly more management/social comments and knowledge source comments. These findings suggest that the adults *did* focus pupils on particular aspects of the exhibits and that the teachers did so more than the chaperones. The data show that, unlike the situation reported for the zoo visitors, the pupils generated more of the affective comments than did the adults ($p < 0.05$ see Table 9.4).

Figure 7.3

Frequency polygon for main categories of conversational content for the three subgroups, of pupils-only, chaperone-groups and teacher-groups at the models

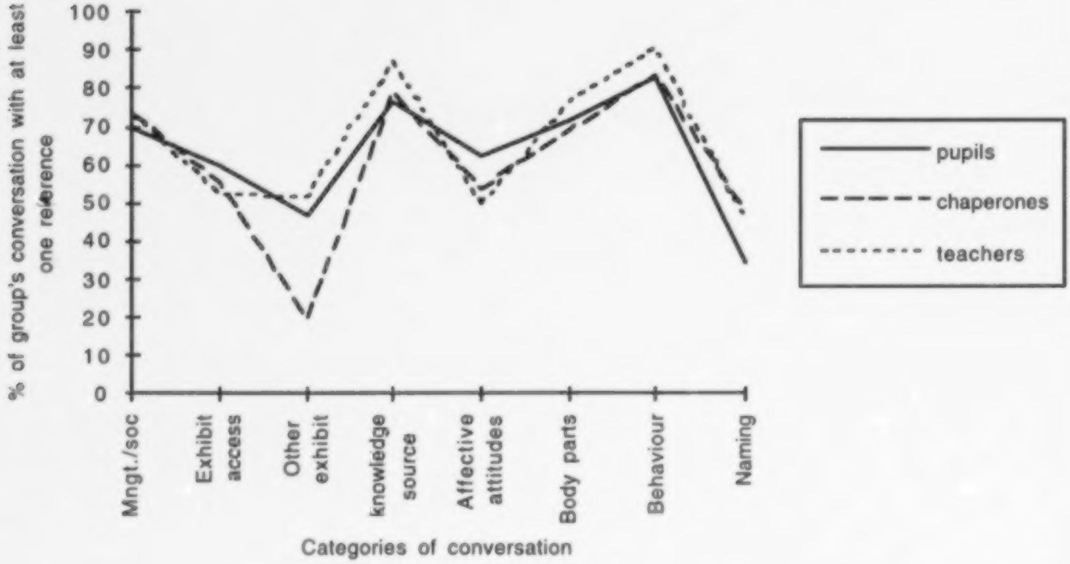
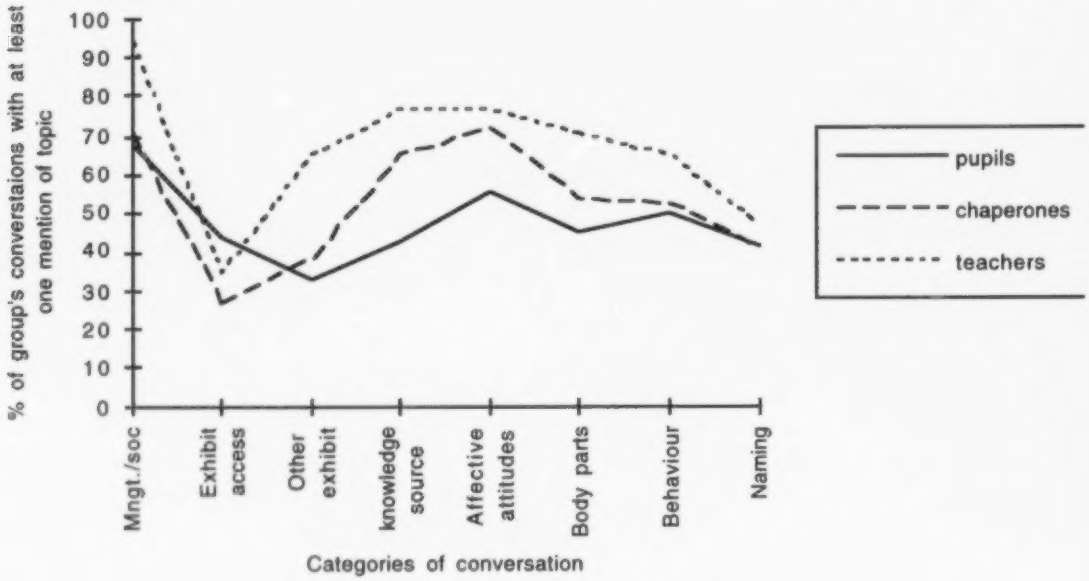


Figure 7.3 displays data taken from Table 7.7 and illustrates the striking similarity in content of conversations generated by all three groups at the animated models. Teachers produced the most and the pupils-only groups the least comments except, as at the preserved animal specimens, pupil-groups generated most affective comments.

Similarly, Figure 7.4, constructed from data presented in Table 7.3, mirrors the pattern found at the animal exhibits of teacher-groups commenting the most and pupils-groups the least. It also illustrates the trend for the visitors at the farm animals to focus on comments that were not directly animal observation, e.g. management/social and affective comments, but that the pupils-only groups made *significantly fewer* affective and knowledge source comments. Lack of knowledge source comments generated by pupils is not surprising but the significantly lower number of affective remarks is. Although pupils are unlikely to ask many questions and make definite knowledge statements to each other about the animals, it is tacitly assumed by teachers and zoo employees that when alone pupils predominantly generate comments of an affective nature. The data presented in this thesis shows this assumption to be invalid, pupils-only groups did not make more affective comments than did the groups with adults.

Figure 7.4

Frequency polygon for main categories of conversational content for the three subgroups of pupils only, chaperone-groups and teacher-groups at farm animals



The fewer knowledge source comments made by chaperone-groups would be expected because the chaperones were parents, not teachers on duty. However, chaperone-groups comments did display some specific differences in conversational content that were not apparent in the other social groups. Management/social comments were higher amongst chaperone-groups at the zoo. It is worth noting again the finding that most affective comments were *not* passed at the live animal exhibits specimens and that the adults, *not* the pupil-only groups, generated more of this category of comment at live animals.

A worrying feature, from the perspective of the quality of the formal educational experience that pupils received during visits to animal collections and farms, is that there was relatively little difference between the pupils' conversational content when they were unaccompanied and that of the groups with the adults particularly in the zoo (Figure 7.1), the models (Figure 7.3) and the farm (Figure 7.4). The greatest differences were in the museum where the teachers and chaperone-groups discussed aspects of behaviour of the static, preserved animals significantly than did the pupils alone. Teachers appeared to be 'teaching' little, except at the animated models, for there was relatively little difference between the content of conversations of chaperone-groups and the teacher-groups.

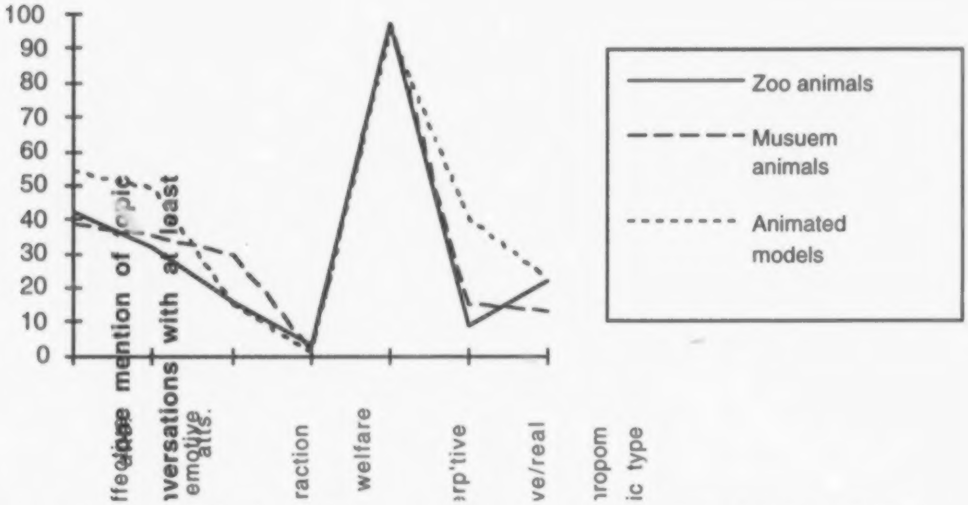
7.2 THE EFFECT OF THE COMPOSITION OF THE SCHOOL GROUP ON THE CONTENT OF THE CONVERSATIONS EXPRESSING ATTITUDES TOWARDS THE SPECIMENS

The opinions of pupils are influenced by the attitudes of the adults accompanying them (ten Brink 1984:89). In this next section a review of the data compares the content of conversations for affective and interpretative attitudes across the three sites where exhibits can be viewed and within the three constituent groups of which school parties are composed.

Figure 7.1 showed that the zoo was the site of least comment about affective attitudes. Figure 7.2 illustrated the commonality of affective comments generated at the three types of animal specimens exhibited and the higher number of conversations with at least one comment about affective (including emotive) attitudes generated at the animated models. Differences within the data, such as more discussion about the authenticity of the specimens at the dinosaurs and about interaction at the static specimens, highlight specific aspects which interest visitors.

Figure 7.5

Frequency polygon of topics of affective and interpretative categories generated by subgroups of school parties at zoo and museum animal specimens and at animated models.



The subcategories of the affective category considered are emotive attitudes (like/dislike), welfare of the animals, human-animal interaction. For the interpretative category they are reality/aliveness of the specimens and anthropomorphic-type interpretation (Fig 7.5). These categories are shown in Table 7.9 for school groups in London Zoo. There were no significant differences between the number of conversations containing affective or anthropomorphic types attitudes of any of the three kinds of school group, which is surprising, indicating that the presence or absence of any of the adults made no apparent difference to the generation of such comments.

However, as the data presented in Chapter 4 indicated, the presence of adults within family groups depressed the frequency of such comments. The low number of conversations with at least one comment about the welfare of animals, apparent from the data in Table 7.9, is interesting. Apparently, adults in family groups who were very concerned about animal rights issues drew the attention of their charges to relevant factors and emotive issues. Clearly the adults with the school groups do not.

Table 7. 9

Attitude, affective and anthropomorphic comments in conversations generated at zoo animals by constituent groups of school parties

Category of attitude comments	School group n = 459		Pupils- only n = 235		With chaperones n = 91		With teachers n = 133		χ_2^2 subgroup totals	Phi^2
	no	%	no	%	no	%	no	%		
Affective attitudes										
emotive attitudes	143	31	67	29	28	31	48	36	2.28	
human/animal interaction	72	16	36	15	9	10	27	20	4.48	
welfare	14	3	5	2	5	6	4	3	N/A.	
Interpretative attitudes										
reality/ aliveness of animal	21	5	13	6	1	1	7	5	N/A	
anthropomorphic-type	100	22	43	18	20	22	37	28	4.52	

If concern for animals in zoos is a dominant feeling in society a higher incidence of welfare comments would have been expected, although Kellert (1985) has pointed out that, contrary to public perception, older elementary pupils do not exhibit positive and caring feelings towards animals. Moreover, the data are inconsistent with the view (Carey 1985) that adults spontaneously interpret animals in an anthropomorphic frame. On the other hand, the adults with school groups may have deliberately used this category of anthropomorphic interpretation to meet the needs, and match the understanding, of the pupils.

The three different groups, teacher-groups, chaperone-groups and pupils-only, commented about human-animal interaction to the same extent (Table 7.9). This interesting finding could reflect an inherent interest amongst visitors, irrespective of their age, concerning 'human/animal' and 'animal/human' interactions. The utterances are concerned either with doministic themes, such as what the speaker would like to do to the animals, or, conversely, express fears as to what the animal could do to them, using expressions such as, 'Will it bite?', 'Will it hurt me?', 'Is it poisonous?', or statements that reflect knowledge about potential danger to humans from the animal. Michael shows concern about potential danger from a snake in segment 28, when he states that the milk snake, '..is dangerous because it is red'. The occurrence of such comments may reflect the tendency of visitors to remark about the human-animal potential interaction at certain species, e.g. snakes, lions, tigers, with which there exists a tradition of human-animal interaction.

Table 7.10

Emotive attitude comments generated at zoo animals by constituent groups of school parties - pupils-only; chaperone-groups and teacher-groups

Category	Total conversations n = 459		Pupils-only n = 235		With chaperones n = 91		With teachers n = 133		χ_2^2 subgroup total	Probability Phi^2
	no	%	no	%	no	%	no	%		
L-comment	18	5	12	5	2	2	4	3	*N/A	
L-noise	25	6	14	6	3	3	8	6	N/A	
D-comment	41	9	17	7	12	13	12	9	2.86	
D-noise	41	9	14	6	7	8	18	14	6.37	$p<0.05$
Other	50	11	23	10	10	11	17	13	0.79	

Table 7.10 shows that the number of conversations which contained at least one expression of an emotive attitude is both low and similar across all three sub-groups of school zoo visitors, with one exception (teacher groups and D-noises). Pupils did not generate Like or Dislike noises (L-noises and D-noises) about the animals to any greater extent than did the pupils-adult groups, although the sample was small for meaningful statistical comparison. Teacher-groups made less L-noises and comments, but slightly more D-noises ($p<0.05$), more D-comments and more ‘other’ comments. Although pupils and their accompanying adults did express their likes and dislikes, the occurrence of these attitudes in the spontaneous conversations was not as high as was expected.

The emotive comments focused around mammals and reptiles which were the largest categories of animals at which data were collected from school groups. The range of animals about which comments were made during the school visits to the zoo is shown in Table 7.11.

Table 7.11

The proportions of conversations generated by school groups in London Zoo at different types of animals

Category of animals	Number of conversations	Number of species in collection[1] n=7443	% of total of all conversations (n = 459)	% of species
Mammals	196	790	43	11%
primates	66	107	14% of total 34% of all mammal conversations	14%
Birds	32	595	7	8
Reptiles	161	232	35	3
Amphibians	2	161	0	1
Fish	39	2390	9	2
Echinoderms	7	not listed	2	N/A
Arthropods	36	509	8	7
Cnidaria	6	214	1	3
Other invertebrates	5	2552	1	0

Table 7.11 shows that, of all the animal types, the groups chose to comment most upon mammals and reptiles, which suggest that these types were looked at the most, for groups had the opportunity to view what they, or their leader, chose to do so. Hence, if zoos and teachers-in-charge are to provide a *balanced* educational experience, in terms of a wide variety of animals studied, the tendency of groups to focus on mammals and reptiles during visits to animal collections with a comprehensive range of taxonomic categories needs counteracting using effective educational strategies which lead groups to focus on other classes and phyla. Does a similar pattern of conversations containing at least one reference to emotive attitudes become evident when the school groups looked at other types of animal exhibit?

Table 7.12 shows that there was remarkable similarity in the number of conversations that composed the category of emotive expressions shown between the constituent groups looking at the preserved, static animals. This result is unlike that in the zoo data where the teacher-groups generated most D-noises.

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[1] data taken from Annual Report of the Zoological Society 1991/2

Table 7. 12

Emotive attitudes generated at museum specimens by the three constituent subgroups within school parties

Category of comments	Total conversations n = 407		Pupils-only n = 176		With chaperones n = 115		With teachers n = 116		χ_2^2 subgroup totals	Probability	Phi ^{2}
	no	%	no	%	no	%	no	%			
L-comment	37	9	22	13	10	9	5	4	5.70		
L-noise	22	5	12	7	5	4	5	4	N/A		
D-comment	26	7	10	6	10	9	6	5	1.46		
D-noise	35	9	12	7	10	9	13	11	1.72		
Other	43	11	15	9	12	10	13	11	0.64		

It would be expected that the comments at the dinosaur models would reflect the pattern for comments at live animals because the models are displaying active behaviours (Table 7.13).

Table 7.13

Emotive attitudes generated at animated models by the three constituent subgroups within school parties

Category of comments	Total no of conversations n = 422		Pupils-only n = 175		With chaperones n = 113		With teachers n = 134		χ_2^2 subgroup totals	Probability	Phi ^{2}
	no	%	no	%	no	%	no	%			
L-comment	38	9	22	13	8	7	8	6	4.73		
L-noise	20	5	7	4	9	8	4	3	N/A		
D-comment	60	14	26	15	17	15	17	13	0.38		
D-noise	58	14	32	18	17	15	9	7	8.79		
Other	81	19	30	17	50	44	21	16	35.07	$p<0.005$	0.08

Table 7.13 shows the data for the subcategories of emotive attitudes generated at the animated dinosaurs.

It is interesting that at animated models, the dinosaurs, the adults express more ‘other’ comments, largely exclamations of ‘Oh!’ and the teacher-groups the fewest D-noises, possibly reflecting standards of talk that are regarded as unacceptable with teachers, but permissible with peers and chaperones. It is salutary to remember that there were only three types of animals in the dinosaur exhibits, in contrast to the range of preserved animals and live zoo animals. Therefore, remarks at the dinosaurs were concentrated on a few specimens of three species, whereas those at the other types of specimens are generated in front of a wide range of species, not all of which are likely to have generated emotive comments.

The data in Tables 7.12 and 13 reveal three important findings. Firstly, that affective attitudes did *not* play a predominant part in the comments of the groups and, secondly, that pupils did *not* generate more of such comments when an adult was not present at animal exhibits. Thirdly, teachers are not uniform in their expression of dislike, disliking zoo animals most and animated models least. Overall, the presence or absence of an adult, and the type of adult present, does not exert a consistent effect on the attitudes expressed in the conversations at animal exhibits. In contrast, in the farm data (Table 7.3) there was a significantly higher number of emotive comments amongst the chaperone-group and less amongst the pupil-only groups. However, whilst such findings call into question the suggestion made by Kellert (1985) that 'Educational efforts among pupils six to ten years of age might best focus on the affective realm, mainly emphasising emotional concern and sympathy for animals.', they highlight the appropriateness of Kellert's remarks for animals that are *not exhibited*, farm animals, and probably, if data were collected in England, for wildlife and pets. Kellert's conclusion was based on responses to questionnaires, not an analysis of comments made whilst watching animals. Nonetheless, the belief that primary school pupils fill the majority of their conversations whilst watching animals with emotive comments and noises appears to be ill founded.

7. 2 COMPARISON OF THE CONTENT OF CONVERSATIONS GENERATED AT THE SAME EXHIBITS BY CHAPERONE GROUPS WITH THOSE OF FAMILY GROUPS

Chaperones, who are mostly parents of pupils in the school, if not in their group, acted during a school visit in place of the teacher. Did a chaperone comment about the animals like a parent or like a teacher? Data considered in section 7.1 show that the content of conversations of chaperone-groups reflected that of teacher-groups more than that of pupil-only groups. If the content of the conversations of chaperone-groups is compared with that of families, does it resemble that content?

7.2 1 Conversations generated at zoo animals by chaperone-groups and families

Tables 7.14 and 7.15 compare the relevant data for the conversations generated within the zoo by chaperone-groups and family groups. Table 7.14 shows that there *was* a difference in the content of families and chaperone-groups, but only within certain categories.

Table 7.14

Comparison of content of conversations generated by school groups containing a chaperone with that of family groups at zoo animals (main categories)

Category	Family n=143		With chaperone n=91		χ_2^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	122	85	91	100	14.68	$p<0.005$	0.06
Exhibit access	123	86	62	68	10.74	$p<0.005$	0.05
Other exhibit	62	43	43	47	0.34		
Body parts	75	53	55	60	1.44		
Behaviour	95	66	63	69	0.29		
Naming	126	88	80	88	0.00		
Affective atts	29	20	38	42	12.55	$p<0.005$	0.10
emotive	10	7	28	31	23.11	$p<0.005$	0.01
Interpretative	142	99	91	100	N/A		
knowledge source	82	57	55	60	0.22		

Chaperone-groups generated more conversations that contained at least one comment about:

- management/social issues;
- affective attitudes, including emotive ones;

and less concerning exhibit access.

Table 7. 15

Comparison of conversations generated at zoo animals by school groups with a chaperone with that of families (animal observations)

Category	Family groups n=143 no	%	With chaperone n=91 no	%	χ_1^2	Probab-ility	Phi^2
Animal obs.	143	99	91	100	N/A		
Body parts	75	53	55	60	1.44		
front end	17	12	20	22	4.25		
dimensions	62	43	45	50	0.83		
unfamiliar	7	5	5	6	N/A		
disrupters	15	11	5	6	1.77		
Behaviour	95	66	63	69	0.29		
position	49	34	32	35	0.02		
movement	35	25	28	31	1.12		
feeding	12	8	15	17	3.61		
attractors	30	21	25	28	1.30		
Naming	126	88	80	88	0.00		
identity	91	64	60	66	0.13		
category	57	40	42	46	0.90		
compare	62	43	35	39	0.55		
mistake	6	4	7	8	N/A		

The lack of any significant differences in the number of conversations with at least one animal focused comment from the two groups at the zoo and shown in Table 7.15, is striking, but not unexpected because of the data considered in Chapter 4. Despite the learning-orientation assumed to be part of the ethos of the school visit, and given as a rationale for undertaking such visits, e.g. Tunnicliffe 1994a, Wolins et al. 1992, the incidence of knowledge source and animal focused comments were similar for chaperone-groups and families.

The data in Tables 7.14 and 7.15 show the similarity between content of conversations about animals in the zoo generated by chaperones-groups and family groups. The data also highlight some differences which can be explained by considering the ambiguous role of the chaperone, which was a change in status from being a parent. Thus, the chaperone who was also a parent, was no longer a member of a family group when accompanying a school party but an associate of professionals who held different, and opposite, objectives for their visit from those of families. Observing the animal specimens was more important than socialisation for schools. The increased number of conversations noted in Table 7.14 with management/social comments could be the result of unfamiliarity of the chaperones with the pupils in their charge and a manifestation of their anxiety not to 'lose' a member of their group. The lower exhibit access value is likely to be the result of the group scanning the exhibits and locating the animals before a comment was voiced. It is unlikely, but possible, that the parent-chaperones had visited the zoo on a number of occasions with the school, or with their family group, and are thus both particularly familiar with exhibits and experienced in locating the animals.

It has been noted (Table 4.10) that overall conversations of school groups contain more exchanges which contained emotive comments. The content of conversations of the chaperone-groups reflected this trend and did not display the low occurrence of such comments that occurred within family groups. This finding suggests that it was pupils, away from the behavioural inhibitions exerted upon them by their own family, but with another adult, who generated more of these comments, not the adults.

The data show that there was a cohesion in content of conversations between families and chaperone-groups at zoo animals. However, it is important to remember that the conversational content of families and school groups in the zoo has been shown, in Chapter 4, to be remarkably similar. The few differences apparent in the data reflect the fulfilling of the changed role expected of a parent as a chaperone and the different rationale of the school visit compared to that of the family.

7. 2 2 Conversations generated by chaperone groups and families at museum animal

The content of the conversations of family and school groups contain significant differences which were discussed in Chapter 5.1.1, and displayed in Tables 5.1 and 5.2. Additionally, the differences between the content of chaperone-groups and teacher-groups viewing the same types of exhibits in the museum have been discussed in section 7.1.2. (Tables 7.5 and 7.6). Table 7.16 displays the data for family groups and school groups which contain a chaperone, not a teacher, looking at animal specimens the Natural History Museum.

It is surprising that, unlike the situation in the zoo, the data in Table 7.16 shows that the chaperone-groups engendered significantly *fewer* management and social comments within the museum than did families. However, chaperone-groups were responsible for significantly more conversations with comments about other aspects of the exhibits. This result indicates that the groups referred to artefacts, labels and the setting in their conversations.

Table 7.16

Comparison of content of conversations generated by chaperone and family groups at museum animal specimens (main categories)

Category	Family groups n = 184		Chaperone-groups n = 116		χ_1 2	Probability	Phi^2
	no	%	no	%			
Mngt./social	142	77	60	52	20.95	$p<0.005$	0.07
Exhibit access	108	59	48	41	8.56	$p<0.005$	0.03
Other exhibit	52	28	57	49	13.41	$p<0.005$	0.05
Body parts	80	44	77	66	14.95	$p<0.005$	0.1
Behaviour	56	30	52	45	17.84	$p<0.005$	0.06
Naming	167	91	102	88	0.61		
Affective atts.	64	35	46	40	0.73		
emotive	41	22	42	36	6.89	$p<0.05$	0.02
Interpretative	176	96	114	98	N/A		
knowledge source	128	70	83	72	0.14		

Although the overall number of conversations with affective comments was similar, the number of conversations that contained emotive comments was significantly higher amongst the chaperone-groups, reflecting the trend for school groups, when pupils are out of the sphere of influence of the family, to generate more emotive comments in both the museum (preserved specimens) and the zoo (Chapters 4 and 5). The chaperone-groups also generated significantly more comments about both body parts and behaviours than did families. This is to be expected *if* the school groups are focusing on educational observational tasks about the animals.

Consideration of the data in Table 7.17 highlights that, compared with the content of the family conversations at preserved specimens, chaperone-groups emphasised observations about body parts and behaviour, particularly the position of the animals. It is interesting that Table 7.17 shows chaperone-groups *compared* the animals significantly more than did families, and, referring to Table 7.6, significantly more than did the teacher or the pupil-groups.

Table 7. 17

Comparison of content of conversations generated at museum animals by chaperone and family groups (animal observations)

Category	Family-groups n=184		Chaperone-groups n= 116		χ_1^2	Probability	Phi^2
	no	%	no	%			
Animal obs	181	98	116	100	N/A		
Body parts	80	40	77	68	14.95	$p<0.005$	0.1
front end	17	9	25	22	8.99	$p<0.005$	0.03
dimensions	62	34	67	58	16.81	$p<0.005$	0.06
unfamiliar	7	4	20	17	15.69	$p<0.005$	0.05
disrupters	15	8	18	16	3.94		
Behaviour	56	30	52	45	17.84	$p<0.005$	0.06
position	19	10	27	23	9.19	$p<0.005$	0.03
movement	12	7	12	10	1.41		
feeding	13	7	7	6	0.12		
attractors	26	14	15	13	0.01		
Naming	167	91	102	88	0.61		
identity	159	84	89	77	4.66		
category	126	69	74	64	0.70		
compare	46	25	83	72	62.90	$p<<0.005$	0.21
mistake	22	12	7	6	2.86		

These data reflect an overall educational emphasis on the observations made during the visit to the museum.

Overall, the exchanges of chaperone-groups at the traditional animal specimens appeared to possess a content resembling that of teachers rather than families. Their presence had a more pronounced effect on conversational content than observed amongst school zoo visitors. An unexpected finding was that chaperone-groups were unique amongst the groups looking at preserved specimens in drawing most comparisons between the static animal specimens, the self and other specimens. I suggest that chaperones, in trying to fulfil their 'teaching' role, were trying to focus comments and to develop comparisons of animals. Such observations required no prior knowledge and were easy to make because of the way in which the specimens were displayed. It is disappointing that a similar emphasis on observations was not made by the teacher-groups (Table 7.6) and the observations on body parts, which could have been developing the pupils' observational skills, were commentary on what was there, not on criterial attributes.

7.2.3 Conversations generated at animatronics by chaperone-groups and families

Both dinosaur models and static specimens were exhibited within the same location, the Natural History Museum, which is associated with a predisposition of visitors for ‘learning’. Therefore, if the chaperone-groups, looking at traditional animal models, had a conversational content significantly different in some categories from that of families at the same exhibits, it is likely that the same phenomenon occurred at the animated models. However, the conversations generated by both family and school groups at animated models, considered in Chapter 4 (Tables 4.13 and 4.14), differed in their emphasis. Family conversations contained more exchanges with management and social comments, whereas the content of those of schools focused on body parts, behaviour, interpretation and knowledge sources, reflecting again the different emphasis inherent between family and school museum visits.

Unlike the data for school and family groups at the zoo animals and the preserved museum specimens, the number of conversations for chaperone-groups and families that referred at least once to attitudes, was similar. Such a finding is not unexpected for the animated models are anomalous. They possess characteristics that resemble live animals but are unfamiliar animals in form, function and name and the data presented in Chapter 4 shows that there was a more pronounced commonality between the content of conversations at these two types of specimens which related to specific attributes of the animals, such as behaviour.

It is interesting that the data in Table 7.18 reflect an emphasis from the chaperone-groups on particular conversational topics such as behaviour, body parts and interpretative comments that reflect a focus to the observations. Families did not comment about the specimens as much as did the chaperone-groups but mentioned other exhibit comments significantly more but, as the data show, families mentioned the specimens in fewer conversations (85%) than did the school groups.

Table 7.18

Comparison of content of conversations generated at animated models by chaperone and family groups (main categories)

Category	Family groups n = 176		Chaperone-groups n = 113		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	147	84	83	74	4.30		
Exhibit access	91	52	63	56	0.45		
Other exhibit	79	45	22	20	19.56	$p<0.005$	0.07
Body parts	95	54	78	69	6.49		
Behaviour	119	68	95	84	9.70	$p< 0.005$	0.03
Naming	84	48	54	48	0.00		
Affective atts	95	54	62	55	0.21		
emotive	83	47	57	50	0.3		
Interpretative	136	77	105	93	12.20	$p<0.005$	0.04
knowledge source	116	66	89	79	5.51		

The fewer comments about the specimens are explained by the very dramatic nature of the exhibits, resulting in fewer comments generated at the exhibit by the families who conversely commented significantly more about other aspects of the exhibit. The data in Table 7.18 show the overall content of the chaperone-groups' conversations generated at the dinosaur models differed from family conversations at the same type of exhibits in that there were significantly more:

- interpretative comments;
- animal focused comments;
- comments about behaviour.

but

- significantly fewer comments about other aspects of the exhibit.

Table 7.19

Comparison of content of conversations generated at animated models by chaperone and family groups (animal observations)

Category	Family-groups n = 176		Chaperone-groups n = 113		χ_1^2	Probability	Phi^2
	no	%	no	%			
Body parts	95	54	78	69	6.48		
front end	13	7	27	24	15.73	$p < 0.005$	0.05
dimensions	58	33	41	36	0.33		
unfamiliar	19	11	16	14	0.73		
disrupters	34	19	40	35	9.34	$p< 0.005$	0.03
Behaviour	119	68	95	84	9.70	$p< 0.005$	0.03
position	17	10	23	20	6.60		
movement	65	37	60	53	8.93	$p<0.005$	0.03
feeding	53	30	36	32	0.10		
attractors	66	38	48	42	0.71		
Naming	84	48	54	48	0.00		
identity	73	42	24	21	12.64	$p <0.005$	0.04
category	46	26	11	10	11.69	$p< 0.005$	0.04
compare	23	13	8	7	2.60		
mistake	0	0	0	0	N/A		

The data in Table 7.19 indicate that the conversational content about animal specimens of chaperone-groups did not mirror that of family groups, for they generated significantly more conversations with at least one comment about the front-end and disrupter body parts as well as about movement and position of the specimens. These findings are surprising because the models are fixed to the spot and clearly seen. Such comments formed part of the narrative that the groups were developing and the chaperone-groups, unlike the family groups, developed such a theme. It is interesting that, unlike that situation found at the static and live animals, there were no more emotive comments within the chaperone-groups than there were within the family-groups. Chaperone-groups mentioned the identity of the animal and the category (i.e. dinosaur but not reptile) to a more significant extent. This was not the case for chaperone groups at the static specimens (Table 7.17). However, chaperone groups mentioned these categories less than did teacher-groups at the same specimens (Table 7.7) and less so than the families who did not name the animals to any greater extent than did the families at the same type of specimen (Table 7.19).

These data indicate that chaperone-groups at the models did generate similar conversational content to that of family groups. Moreover, the presence of a chaperone in a group altered the conversational content from that of groups of pupils alone (Table 7.7). The groups acted more like teacher-groups r than family groups. The nature of the exhibit affected the content of conversations of chaperones because the content of conversations of chaperone-groups in the museum at preserved specimens reflected a similar content of conversation to that of the teacher-groups (Tables 7.7 and 7.8) more than that of family-groups.

7.2.4 Overview - content of conversations of chaperone and family groups compared

Not unsurprisingly, the content of the conversations of chaperone-groups reflected the trend identified in the data between schools and families, that groups containing an adult, focused more on the exhibits and exchanged more information when there was a formal educational rationale for the visit. The data suggest that the chaperones acted 'in place of the teacher', modelling their behaviour on their expectations of how a teacher would behave with a group of pupils, perhaps using their recollections of adult behaviour on school visits. Although there were differences between teacher-groups and chaperone-groups, the school visit with an adult generated more content about the animals. The results reinforce observations made by other researchers, such as Rosenfeld (1980). School groups focus the attention of their participants more on the animals' structure than do family groups.

Summary

School visits have a surprising uniformity in content of conversations irrespective of the composition of the groups in terms of the presence or absence of an adult and the status of that adult. This finding gives rise to some concern because, although the data suggest that the content of the conversations of groups within which there is a non-teacher adult (chaperone) is more like the content of the conversations of teacher-groups than of family groups, a more striking difference between chaperone-groups and teacher-groups would be expected *if* the pupils within the teacher-groups *were* being taught and utilising effectively the learning opportunities presented by observing these different types of animal exhibit and different kinds of species. The data suggest that teachers are *not* grasping learning cues presented for them and we can speculate that this may be either because the teachers are not aware of the potential, or do not regard the school visit as a cognitive learning experience, envisaging that its main purpose is of an affective or even a social or cultural nature. In turn, the lack of apparent teaching suggests that the zoos and museums have a challenge to meet in helping teachers achieve the maximum potential for observing and learning about animals during these visits. The data for the farm school visit emphasises the similarity in conversational content about animals for all subgroups within a school party and reinforces the view that the farm visit was not focused on science work, or that of any curriculum area but was an affective experience.

CHAPTER 8

THE EFFECT OF THE AGE OF THE PUPILS ON THE CONTENT OF THE CONVERSATIONS OF SCHOOL GROUPS

In this chapter I will consider whether the age of the pupils in the school groups had any apparent effect on the content of the conversations. As children develop it is likely that their attitudes and interests change as they extend their experiences, for, if a child can only centre on one aspect of a topic at a time (Child 1985: 149) and look particularly at salient features of objects (Tversky 1989), it would be expected to consider other aspects of animals and be able to consider abstract relationships as they develop towards the formal stage of thinking (Inhelder and Piaget 1964: 47). Therefore, it would be expected that, as the children develop, the pattern of their conversational content would change and, as they learnt zoological taxonomy, they would comment on more features which are important for taxonomy and on fewer which are salient in everyday terms. Children would begin to appreciate the importance of noting criterial attributes not cursory observations.

The data presented previously in this thesis has shown that school visitors generated more of such affective comments than do families, but we do not know whether this phenomenon was age related or not. To obtain large enough groups for chi-squared analysis the age data were collapsed to two categories: age group one of pupils of seven years and younger (infants and Key Stage 1) and age group two of pupils of eight to twelve years of age, (junior school children and Key Stage 2), and some twelve year olds in middle schools, who were deemed as primary pupils at the time of data collection.

8.1 CONVERSATIONS GENERATED AT ZOO ANIMALS BY GROUPS WITH OLDER OR YOUNGER PUPILS

More pupils belonging to the older age group visited the museum in school groups (Table 8.1), but the zoo and animated models in the museum were places for younger children to visit. Over half of the pupils whose conversations were recorded at the dinosaur exhibits were six or seven year olds. It was anticipated that the frequency of the comments generated by the school groups, particularly about the reality of the specimens, and affective attitudes would be related to the age of the pupils and that it would the emphasis on these topics would be greater in the conversational content of the groups containing pupils of eight years and older.

Table 8.1

Age groups of school children at animal exhibits

Age Group	Animatronics n =422		Museum animals n =407		Zoo animals n = 459	
	no	%	no	%	no	%
Pre-school & 5 year olds	49	12	8	2	133	29
6 & 7 year olds	222	57	123	30	160	35
8 & 9 year olds	115	27	77	19	84	18
10 & 11 year olds	27	6	186	46	39	9
12 year olds	9	2	13	3	43	9

The data used for the comparison of age groups is presented in the tables in this chapter as the percentage of the conversations for the age group and not of the overall total.

8.1.1 Conversations generated by the two age groups at zoo animals

The relevant data for the main conversational categories for the school groups of the two main age groups, pupils of seven and below and pupils older than seven, are shown in Table 8.2. No similar data for family groups were available.

The similarity in conversational content between the two age groups, shown in Table 8.2, is striking. The only significant differences were in the number of conversations containing affective attitudinal comments when the number was considered as a percentage of the total of conversations within that age groups.

Table 8.2

Content of conversations generated at zoo animals by the two age groups (main topics)

Category	Age group 1 (seven years and younger) n = 293			Age group 2 (eight to twelve years) n = 166			χ_1^2	Probability	Phi^2
	Total conversations n = 459		% of age group 1 n = 293	Total conversations n = 459		% of age group 2 n = 166	(totals of age groups n = 293 and n = 166)		
	no	%		no	%				
Mngt./social	227	50	77	127	28	77	0.06		
Exhibit access	184	40	63	105	23	63	0.01		
Other exhibit	134	29	46	93	20	56	4.49		
Body parts	179	39	61	101	22	61	0.03		
Behaviour	186	41	64	115	25	69	1.58		
Naming	231	50	79	140	31	84	2.07		
Affective atts.	100	22	34	93	20	56	20.85	$p<0.005$	0.05
emotive	75	16	26	68	15	41	11.67	$p<0.005$	0.03
Interpretative	286	62	98	157	34	95	N/A		
real/live	13	3	4	8	2	5	N/A		
knowledge source	156	34	53	98	21	59	1.44		

Table 8.2 displays data that shows that older pupils generated significantly more affective comments as a proportion of their total conversations than did the groups with children of seven and under. An affective interest in live animals in the zoo is a phenomenon of older pupils and their accompanying adults and is likely to be related to their personal and social development, their increasing awareness of relationships and emotions as puberty approaches and of their role in respect of other people, pointed out by Morris and Morris 1966: 172).

Table 8.3

Content of conversations generated at zoo animals by the two age groups (animal observations)

Category	Age group 1 (Seven years and under) n = 293			Age group 2 (Eight to twelve years) n = 166			χ_1^2 Totals of age group	Probability	Phi^2
	Total conversations n =459 no	%	% of age group 1	Total conversations n = 459 no	%	% of age group 2			
Body parts	179	39	60	101	22	61	0.002		
front end	49	11	17	28	6	17	0.002		
dimensions	150	33	51	87	19	52	0.01		
unfamiliar	20	4	7	12	3	7	0.03		
disrupters	33	7	11	24	5	15	1.00		
Behaviour	186	41	63	115	25	69	1.58		
movement	76	17	26	54	12	33	2.27		
feeding	24	5	8	30	7	18	9.97	$p<0.005$	0.02
position	109	24	37	68	15	41	0.63		
attractors	66	14	23	49	11	30	2.76		
Naming	231	50	79	140	22	84	2.07		
identity	212	48	72	106	23	64	3.60		
category	159	35	54	61	13	37	13.03	$p<0.005$	0.03
compare	118	26	40	62	14	37	0.38		
mistakes	23	5	8	10	2	6	0.53		

The data in Table 8.3 show a similarity in comments about animals, except that significantly more comments about feeding behaviour were generated by groups containing older pupils and those of groups containing younger pupils referred significantly more to categorisation of the animals. In view of the basic human need for categorising and naming objects (Bruner, Goodnow and Austin 1956: 2; Bruner 1983) this latter finding is not surprising, and members of the groups with pupils of seven and younger gave a 'category' name to the animals, using terms such as bird, fish. The similarity in content of the conversations at the zoo of the two distinct age groups was both surprising and disappointing, for it did not reflect an emphasis on particular aspects that would have been expected if the visits were progressing pupils' scientific understanding.

8.1.2 Emotive comments generated by the two age groups at zoo animals

Table 8.2 shows that the percentage of conversations containing emotive comments was significantly different when examined as a proportion of the total of conversations for the age group. The data in Table 8.4 show that the number of conversations for each group that expressed negative attitudes were significantly different (Table 8.4). More D-noises were made by groups with the older pupils, and, by referring to data in Table 7.10, it can be seen that those groups with a teacher generated the most of these comments.

Table 8.4

The occurrence of emotive attitudes (Like/Dislikes) in the conversations of two age groups

Category	Total number of conversations n =459		Seven years and younger n = 293		Eight to twelve years n =166		χ_1^2	Probability	Phi^2
	no	%	no	%	no	%			
Like comments	18	4	9	3	9	5	N/A		
L- Noise	25	6	11	4	13	8	N/A		
Dislike Comment	41	9	17	6	24	15	9.15	$p<0.005$	0.02
D-Noise	41	9	18	6	23	14	7.78	$p<0.005$	0.02
Other, e.g. 'Oh!'	50	11	31	11	19	12	0.08		

It is noteworthy in the data in Table 8.5 that the groups of younger pupils, whose conversations were recorded, looked at fish more than the older groups who viewed more arthropods, primates and birds and it is the primates, arthropods and reptile categories that are believed to engender more emotive responses.

Table 8.5

The proportion of conversations generated by school groups in London Zoo at different types of zoo animals

Category of animal	Number of conversations	% of total of all conversations (n = 459)	Seven years and younger (n = 293)	Eight to twelve years (n = 166)	Total number of species (data from Annual Report of Zoological Society 92-93)
Mammals	196	43	115 (39%)	81 (49%)	780
primates	66	14% of total 34% of all mammal conversations	36 (12%)	30 (18%)	107
Birds	32	7	13 (4%)	19 (12%)	595
Reptiles	161	35	116 (39%)	45 (27%)	232
Amphibians	2		2 (1%)	0	161
Fish	39	9	38 (29%)	1 (1%)	2390
Echinoderms	7	2	7 (2%)	0	not listed
Arthropods	36	8	9 (3%)	27 (16%)	509
Cnidaria	6	1	6 (2)	0	214
Other invertebrates	5	1	1	4 (2%)	2552

The data presented in Table 8.5 suggest that other factors which heighten the anxieties and dislikes of children towards reptiles were influencing the conversational content. It is surprising that significantly more emotive attitudes were expressed by groups containing older pupils when Seligman (1971) and Gray (1971) found that the fear of certain animals is inherent and peaks at about four years. Of the 161 conversations that referred to reptiles, more were generated by age group 1, this means that 40% of the total conversations of group 1 were focused on these animals. In contrast, 27% of the conversations age group 2 were about reptiles. This suggests that there could have been a greater *fascination* with reptiles in the zoo amongst groups with the younger pupils, but, as the data in Table 8.4 shows, less voiced dislike, or that more of the groups with younger pupils saw the reptiles. Observations made at the time of data collection suggest that the school groups with younger pupils *did* choose to view the reptiles and birds whereas those groups containing older pupils *did* choose to visit the primates, birds, and arthropods.

Neither children nor the accompanying adults necessarily voiced a dislike or fear of an animal, even if such an attitude were held. Groups containing older pupils commented more about primates and such a result could be because the groups with older pupils *looked* at more primates (Table 8.5). The higher number of comments about primates is likely to account for the higher incidence of emotive attitudes within the data. The data in Table 8.5 suggest that increased interest in particular groups, such as primates and arthropods, could be associated with the greater number of conversations amongst the older age group which contained at least one expression of dislike.

The data do provide a limited explanation of why older pupils and their accompanying adults choose to look more at certain kinds of animals and suggest that increased interest in particular groups, such as primates and arthropods, could be associated with the greater number of conversations amongst the older age group which contained at least one expression of dislike. The choice of animals to view could be associated with the focus of the educational topic of the visit; the position of the enclosures where the primates and reptiles are kept in the centre of the zoo and effective signs for the location of these groups of animals as well as a interest in seeing these specimens. The data in Table 8.5 reflect the emphasis of the visitors' comments on mammals and reptiles, only two of the animal species available to be seen within London Zoo.

The low number of positive attitude comments towards live animals was surprising and was not what had been expected. However, Kress (1975) found that the influence of the adult on children was the critical factor in changing the attitudes of children to animal specimens that they disliked, thus it appears that adults could have been affecting or suppressing the spontaneous expressions of positive attitudes from pupils about live specimens, or they could have been encouraging the expression of negative ones.

Other types of mammals were the subject of interpretative comments (Table 8.6) Almost three quarters of the total of conversations for school groups that contained anthropomorphic comments were about mammals, as were 73% of conversations that compared a specimen with the human form. Of the conversations containing at least one comment about human/animal interaction, just under half (44%) were generated whilst looking at mammals and 39 comments were made by groups with younger pupils, and 33 comments by members of the groups with pupils of eight years and older (out of 72 total), 33 (17%) comments were referring to mammals. It is interesting that the more altruistic attitudes, such as welfare, became apparent amongst groups comprised of older pupils, and were nearly all about mammals (11 out of 14) with the majority being generated amongst the oldest pupils, eleven to twelve year olds.

8.2 CONTENT OF THE CONVERSATIONS GENERATED AT OTHER TYPES OF EXHIBITS AND FARM ANIMALS OF GROUPS OF THE TWO AGE GROUPS

The variable of 'age' needs to be examined for all the main categories of topics of conversation at different sites and different types of exhibits. It is not known whether children make similar comments when similar species of animal specimens are displayed in a different location, zoo or museum or on the farm, and in different states, alive or preserved, and as an exhibit or not.

8.2.1 Content of the conversations generated by the two age groups at animated models

Although the animated models were sited within the museum, with all the accompanying expectations associated with the building and its work, the animated models were a new type of permanent exhibit about a subject that is popular with children but is usually portrayed in 2-dimensional drawings, animations or dramatic presentations, or as 3-dimensional skeletons. Dinosaurs are a topic particularly associated with Key Stage 1 pupils, and, at the time of data collection, fossils were a topic that was included in the programme of study.

Table 8.6 (below) shows that the content of major categories of conversation generated at the dinosaur models presented for the two age groups. There is a striking similarity in content. The only significant difference was that groups containing younger pupils commented upon the reality of the exhibit, illustrated by the number of conversations that were coded in the 'alive/dead' category.

Table 8.6

A comparison of the content of conversations generated at animated models by the two age groups (main topics)

Category	Animated models Seven years and below n =271		Animated models. Eight to twelve years n =151		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	194	72	110	73	0.08		
Exhibit access	146	54	93	62	2.35		
All exhibit	136	50	71	47	0.39		
Body parts	193	71	116	77	1.55		
Behaviour	237	88	126	83	1.30		
Naming	119	44	57	38	1.52		
Affective attitudes	140	52	89	59	2.07		
emotive	121	45	78	52	1.91		
Interpretative	258	95	142	94	0.27		
knowledge source	221	82	118	78	0.71		
alive/ dead	95	35	30	20	10.73	$p<0.005$	0.03

Table 8.7

A comparison of the content of conversations generated by the two age groups at animated models (animal observations)

Category	Seven years and younger n = 271		Eight to twelve years n = 151		χ_1^2	Probability (1df)	Phi^2
	no	%	no	%			
Body parts	193	71	116	77	1.55		
front end	73	27	40	27	0.01		
dimensions	106	39	67	44	1.11		
unfamiliar	40	15	19	13	0.38		
disrupters	100	37	62	41	0.71		
Behaviour	237	88	126	83	1.30		
movement	152	56	97	64	2.66		
position	54	20	26	17	0.46		
feeding	87	32	40	27	1.45		
attention	123	45	59	39	1.58		
Naming	119	44	57	38	1.52		
identity	103	38	44	29	3.36		
category	64	24	22	15	4.89		
compare	18	7	17	11	2.72		
mistake	6	2	0	0	N/A		

Table 8.7 shows that, as with the superordinate topic categories, there was no subordinate category of animal focused observations which were mentioned significantly more by one of the two age groups when they looked at the animated models. The groups observed and commented in the same proportions, *irrespective* of age group. This striking result may be due to the novelty of the animated dinosaurs which were being viewed for the first time by all the visitors. The data were collected in the few months immediately following the opening of the exhibition. This remarkable cohesion of conversational content at the dinosaur models may be the result of the novelty of the exhibit which overrides other aspects of the exhibits, such as site, type of animal, that might have exerted an influence on conversational content (Miles et al. 1988: 57).

8.2.2 The content of conversations generated by the two age groups at farm animals

Although the animals observed on the farm were not exhibits per se, it was likely that the school groups containing pupils of eight years and over would comment on the same topics because both sets of animal were alive. There was a significant increase in the affective comments generated by older pupils at the zoo (Table 8.2).

Table 8.8

Comparison of the content of conversations generated by the two age groups at the farm (main categories)

Category	Farm animals Seven years and under n = 52		Farm animals Eight to twelve years n = 196		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	38	73	137	70	0.20		
Exhibit access	13	25	83	42	5.21		
All exhibit	18	35	73	37	0.12		
Body parts	28	54	111	57	0.13		
Behaviour	26	50	103	53	0.11		
Naming	24	46	81	41	0.39		
Affective atts	32	62	144	74	2.84		
emotive	20	39	93	48	1.34		
Interpretative	47	90	149	76	5.12		
knowledge source	33	64	94	48	3.95		
Environment	1	2	1	1	N/A		

Table 8.8 shows the data for conversational comments of the two age groups talking about farm animals. It is interesting that the farm data, unlike that from the zoo, show no significant differences in numbers between the two age groups for any category of conversations. Groups with primary pupils of eight years and above did not generate more affective attitude comments.

Table 8.9

Comparison of the content of conversations generated by the two age groups at farm animals (animal observations)

Category	Farm animals Seven years and under n = 52		Farm animals Eight to twelve years n = 196		χ_1^2	Probability	Phi^2
	no	%	no	%			
Body parts	28	54	111	57	0.13		
front end	11	21	35	18	0.30		
dimensions	22	42	78	40	0.11		
unfamiliar	3	6	29	15	2.98		
disrupters	0	0	7	4	N/A		
Behaviour	26	50	103	53	0.11		
movement	24	46	5	3	75.67	$p<<0.005$	0.30
position	4	8	30	15	10.58	$p<0.005$	0.01
feeding	13	25	40	20	2.70		
attractors	13	25	47	24	0.02		
Naming	24	46	81	41	0.39		
label	23	44	66	34	1.99		
category	22	42	60	31	2.54		
compare	1	2	25	13	N/A		
mistake	1	2	1	1	N/A		

Table 8.9 shows the similarity in data between the age groups except that members of the group containing pupils of seven years and younger commented significantly more about the movements of the animals and, in contrast, the conversations of the groups with the older pupils focused particularly on the position of the animals. This last observation is difficult to explain, but the comments of the groups with younger pupils about movement were not surprising because movement is one of the attributes used by younger pupils in assessing whether an animal is alive and is one of the key features noticed about an object.

8.2.3 The content of conversations generated by the two age groups at museum animals

There were predominantly more pupils of eight years and over, two thirds of the total number of conversations, who were visitors within the school groups to the museums to look at static, traditional animal specimens (Table 8.10).

Table 8. 10

Comparison of the content of conversations generated by the two age groups at museum animals (main categories)

Category	Museum animals Seven years and under n = 131		Museum animals Eight to twelve years n = 276		χ_1^2	Probab-ility	Phi^2
	no	%	no	%			
Mngt./social	89	68	181	66	0.22		
Exhibit access	76	58	143	52	1.38		
Other exhibit	65	50	155	56	1.53		
Body parts	78	60	165	60	0.00		
Behaviour	55	42	97	35	1.78		
Naming	112	85	232	84	0.14		
Affective atts	57	44	162	59	8.24	$p<0.005$	0.02
emotive	40	31	105	38	2.18		
Interpretative	127	97	268	97	N/A		
alive/dead	15	12	47	17	2.14		
knowledge source	97	74	199	72	0.17		

The greater number of conversations from older pupils (eight years and over) that were collected and analysed reflects the tendency of teachers to bring older primary school pupils to the museum to look at the static specimens. Table 8.10 shows that there was a surprising uniformity in the pattern of the content of the conversations at the traditional specimens and, as in the zoo, the groups containing older pupils generated more affective comments.

Table 8.11 shows that the similarity in content of comments directly related to the preserved animal specimens is strikingly similar between the two age groups. The only difference is that groups containing younger pupils put more emphasis on feeding-related topics, the opposite situation from comments in the zoo, and possibly reflecting the emphasis given to feeding as a topic by the adults accompanying the pupils. The data samples are too small to use chi-squared analysis.

Table 8.11

Comparison of the content of conversations generated by the two age groups at museum animals (animal observations)

Category	Museum animals Seven years and younger n = 131 no	%	Museum animals Eight to twelve years n = 276 no	%	χ_1^2	Probability	Phi^2
Body parts	78	60	165	60	0.00		
front end	18	14	49	18	1.04		
dimensions	65	50	136	49	0.00		
unfamiliar	12	9	45	16	3.77		
disrupters	13	10	26	10	0.03		
Behaviour	55	42	97	35	1.78		
movement	11	8	29	11	0.45		
position	26	20	43	16	1.15		
feeding	20	15	8	3	N/A		
attractors	20	15	33	12	0.86		
Naming	112	86	232	84	0.14		
identity	102	78	195	71	2.34		
category	83	63	149	54	3.18		
compare	50	38	116	42	0.55		
mistake	9	7	14	5	N/A		

The data presented in Table 8.11 suggest that the lack of any visible behaviours of the animals encouraged visitors to construct their own narrative, and, in the case of schools, one that may have contained key points for the pupils to attend.

The number of conversations that contained at least one affective comment has emerged as one of the key differences between family and school groups. A more detailed consideration of the distribution of the component categories of affective and interpretative comments is shown in Table 8.12. Reference to Appendix 2.2, Tables 2, 3 and 4, show that the groups looking at the preserved animal exhibits generated twice as many conversations with comments about human/animal interaction than did groups looking at zoo animals or the animated models. However, the data in Table

8.12, below, shows that, as in the conversations generated at the zoo, the groups with older pupils generated more affective comments but referred to authenticity of the specimens and explained the animals in human terms to a similar extent in both age groups.

Table 8.12

Narrative comments (affective and interpretative) generated by the two age groups at museum animals

Category of conversations	Museum animals Seven years and younger n = 131		Museum animals Eight to twelve years n = 276		χ_1^2	Probability	Phi2
	no	%	no	%			
Affective attitudes	57	44	162	59	8.24	$p<0.005$	0.02
Human/animal interaction	26	20	97	35	9.86	$p<0.005$	0.02
welfare	1	1	8	3		N/A	
Interpretative comments							
explain in human terms	13	10	28	10	0.01		
alive/dead	15	12	47	17	2.14		

The data shown in Table 8.13 show that the groups containing pupils of the younger age range discussed possible interactions with the exhibits more than did the older pupils. In the younger age group there was reflected a more concrete approach to investigating the environment. However, the conversations of the groups containing the older pupils contained significantly more conversations with at least one reference to human animal interaction than did the ones generated by the younger age group.

Table 8.13

Comparison of the conversational content about 'other' aspects of the exhibit generated by the two age groups at museum animals

Category	Museum animals Seven years and younger n = 131		Museum animals Eight to twelve years n = 276		χ_1^2	Probability	Phi^2
	no	%	no	%			
exhibit furniture	31	24	66	24	0.003		
setting	22	17	58	21	1.00		

interaction	34	26	28	10	17.70	p<0.005	0.04
label	15	12	45	16	1.67		

Table 8.13 shows that significantly more comments were made about wishing to touch parts of exhibits by members of the group with younger pupils. The conversation that is reported in the following exchange was made by a group of year 3 pupils with a chaperone who was focusing the attention of the pupils onto the exhibit in the Mammal Hall, particularly at the footprints associated with the relevant specimens.

Adult: There's the sheep and there's the reindeer and there's a hippo, now whose foot is that?
Boy: Hippo?
Adult: And whose is this one? Look at the size of it.
Girl: That one must be a sheep.
Adult: What about the big one?
Girl: That one? That piggy thing?
Girl 2: Yes and that one.
Girl 1: That's bit big for the little one there.
Adult: No you can't touch it Jason. If all the children touched them, they'd get dirty.

The traditional exhibits of preserved specimens, which are often associated with more recently designed 'hands-on' materials, provided opportunities for discussion about interactions and actual physical contact with parts of the exhibit to a greater extent than was permitted and envisaged within both the zoo, the farm, and at the animated models. Groups containing younger pupils referred to interaction with the exhibits significantly more than did the groups with older pupils (Table 8.13) and such a finding is not surprising because the concrete experience is of more importance to younger children because, at around seven years of age, children are able to manipulate and hold ideas (Piaget and Inhelder 1969: 96).

Overall there were no significant differences in the number of main categories of conversation generated at animal exhibits between two age groups except for that of affective attitudes. The lack of a distinct emphasis within the data on particular topics, such as body parts, behaviour, or naming, is surprising and again causes questions to be asked about the effectiveness and appropriateness of the tasks and comments generated within the groups. Older pupils would have been expected to have a greater emphasis on both categorising and comparing criterial features of animals and unfamiliar body parts, if the visits were being used to develop their biological understanding.

If comments about realness *were* a developmental phenomenon, it would be expected that a far larger percentage of the conversations of the younger age groups would contain comments about authenticity at the preserved animal exhibits. The data in the tables presented in this chapter show that the opposite effect from that which had been anticipated was observed. Comments about reality were not a straight forward developmental phenomenon but associated with the nature of the exhibits, e.g. Tables 8.2, 8.6 and 8.10. Significantly more 95 (35%) groups with pupils of the age of seven years and below commented about authenticity of the dinosaurs, but only 75 (15%) of the groups with older pupils did so. The figures for the same category and age groups at the preserved animals are 16 (12%) and 47 (17%) respectively. There were too few comments about authenticity in the zoo to perform a $\chi_1{}^2$. The *context* in which the comments are generated is important in discussing the issue of 'real,' 'alive' or 'dead' and the interest of the different age groups in the phenomenon of authenticity for the particular type of specimens.

Summary

Surprisingly, the age of the pupil within a group had little effect on the content of the conversations. Conversations generated by school groups possessed an unexpected uniformity in content, irrespective of the age group of the pupil within the group. This finding gives rise to some concern because, although the data suggest that the content of the conversations of groups was similar, is it educationally desirable and correct that it should be so? The data suggest that teachers were *not* developing the observations made by the pupils in way appropriate for their stage of development. Whilst the data showed that observations were made at the animal exhibits, and that there was increased comments about affective issues as children developed, the lack of a different emphasis of particular aspects such as body parts that are important as defining attributes is of concern. Zoology is an observational science and the development of this, as children develop, should have been apparent within the data if science teaching were occurring.

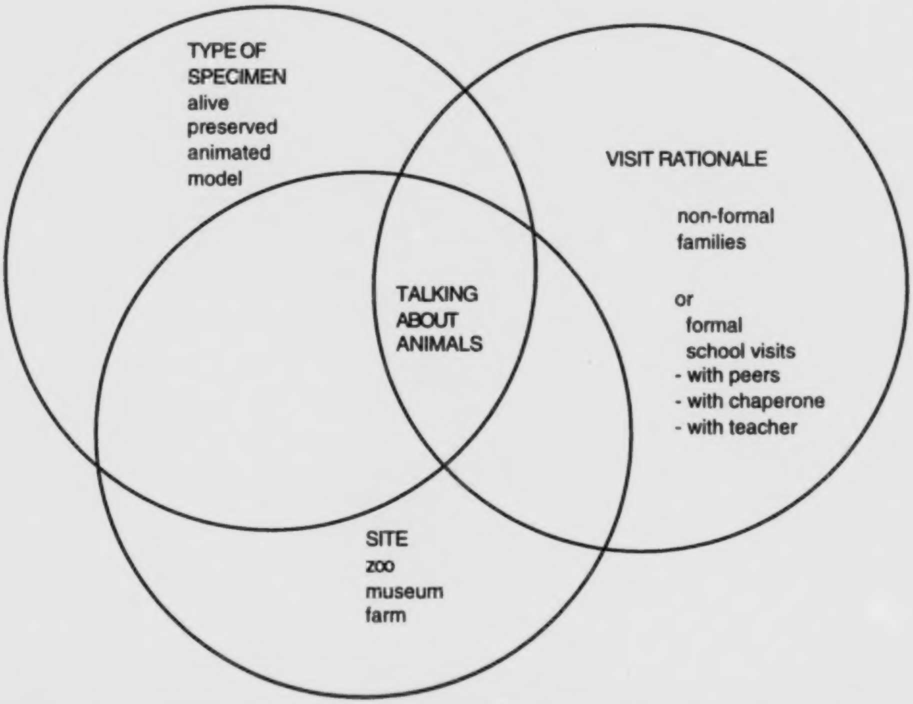
CHAPTER 9

OVERVIEW OF CONVERSATIONS AT ANIMAL SPECIMENS

This chapter draws together, compares and considers, the overall data for the three types of animal exhibit in the two sites where data were collected, the Natural History Museum and London Zoo, and for farm animals. Chapters 4 to 8 considered separate aspects of factors which influence the content of conversations of groups of visitors containing primary aged children and looking at animal specimens and this chapter provides an overview of these findings.

Figure 9.1

The three main influences on the content of conversations at animal specimens


TYPE OF SPECIMEN
alive
preserved
animated
model
VISIT RATIONALE
non-formal
families
or
formal
school visits
- with peers
- with chaperone
- with teacher
TALKING ABOUT ANIMALS
SITE
zoo
museum
farm

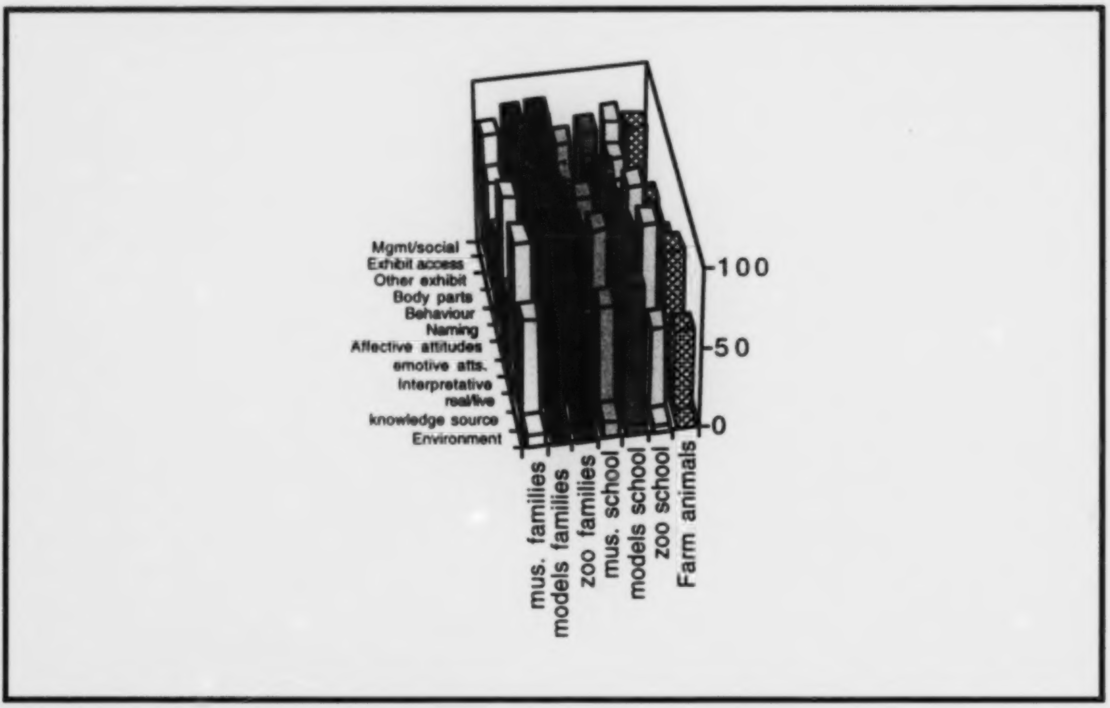
There are a number of factors which influence the content of the conversations of visitors at animal exhibits. These are summarised in Figure 9.1.

9.1 AN OVERVIEW OF THE CONTENT OF VISITORS' CONVERSATIONS AT ANIMAL SPECIMENS

The main categories of the data in Tables 2, 3, 4, 13, 14 and 15 in Appendix 2. 2 are summarised in Figure 9.2.

Figure 9.2

The main categories of conversation generated by all groups of visitors at all sites and types of animal specimen



The first important finding in this research is that visitors talked about exhibits when in front of them and this result supports the findings of McManus (1987:279). A second important finding for educational zoologists is that in all groups, except families at the animated dinosaurs, visitors mentioned the animals within the exhibits in nearly every conversation (Figure 9.2).

A third key finding is that a *similar range* of content was found within conversations at *all* animal exhibits (Figure 9.2). The most frequent topic mentioned was interpretative comments, followed by management and social comments, other aspects of the exhibit, attitudes and animal focused comments but very few environmental comments were generated and more were heard in the museum at preserved specimens than the zoo. This is a finding of paramount importance to zoos in particular who focus so much of their interpretation and exhibit emphasis on conservation. However, some categories are emphasised more at one site rather than another and a particularly important finding is that, surprisingly, affective comments were generated overall *more in the museum than at the zoo* (Figure 9.2). Furthermore, this emphasis is provided by one type of group rather than another, the affective comments are generated by *school groups* not families. This finding refutes the assertion that the affective component is stressed during a family zoo visit (Rosenfeld 1980:77) but establishes that it is an important aspect of school outings to animal specimens.

A fourth important observation drawn from the data is about the pattern of animal observations. All groups referred to the salient features of specimens, their size, shape, colour, as children have been shown to do for other objects (Tversky 1989), and to the actions and those behaviours of the specimens that were occurring at the time of observation. Visitors provided an identity for a specimen, sometimes categorising it and comparing with other objects, animals and the self. This similarity in the topics of the observations of visitors, irrespective of the types of specimens and the sites where they were viewed, is particularly important for educators, both in collections and schools, for it provides a basis on which to build educational tasks in which pupils, and indeed the public, are involved in terms of planning effective educational visits. Moreover, the data provide a benchmark against which other similar animal collections, i.e. zoo, museum or farm, can assess the content of their visitors' conversations and then any affect which changes in exhibits or educational tasks may bring about.

In view of the very different nature of the exhibits a striking finding is that the number of conversations drawing attention to the specimens (exhibit access) was similar for *so many types* of specimen, *irrespective of the site.* Most comments were generated in the zoo and the least on the farm, both at live specimens (Tables 2-16 Appendix 2b). This phenomenon may have been the result of adults having visited the zoo exhibits previously so that they knew how and where to look for specimens, or because the group members did not speak until they had located the animal within the zoo exhibits and were able to point them out to companions. Conversely, the farm animals were very easy to see and were set in utilitarian rather than naturalistic settings.

Another interesting result is that the number of comments generated by school groups about other aspects of the exhibit were broadly similar between the zoo and the museum animals, preserved or animated models (Figure 9.2 and Tables 2, 3, 5, 13, 14, 15, in Appendix 2b). The lack of a significant difference in the number of other exhibit comments generated at the dinosaur diorama, where there are some particularly noticeable aspects of the display, the insect noises, the cave, the roar in the distance at the diorama, and the lack of anything at the exit dinosaur model, about which visitors could have commented, but did not, is a surprising finding. However, the number of conversations which contained at least one comment in this 'other exhibit 'category was much less for family groups in the museum (Figure 9.2). The significance of the findings concerning 'other exhibit comments' are discussed further in section 9.2.1.

The above discussion emphasises a very important finding from this research, namely that the site of the exhibit, and hence the nature of them, affects the content of conversations. Data in Chapter 4 and 5 show that within similar groups, i.e. school or family, although the pattern of comments is similar, more comments which reflect the influence of the site, were heard about certain topics within the different sites (Tables 5.5, 5.6, 5.7 and 5.8), e.g. more knowledge source comments were generated in the museum but more exhibit access comments in the zoo. Such a result is not surprising because different sites, and the types of exhibit they show, have particular features inherent in their exhibit's design.

The conclusion drawn from the data, considered in Chapters 4 to 8 is that, that although visitors did refer to similar topics, differences within conversations were influenced by three main factors: the sites of exhibit, the types of exhibit and the rationale for the visit are very important for visitor studies and for science education. An understanding of the separate factors and their inter-relationships could be used in improving the educational component of vistas to the different types of exhibits.

9.2 THE THREE MAIN FACTORS AFFECTING CONVERSATIONAL CONTENT

9..2.1 The site

There are considerable differences between the overall sites of London Zoo and the Natural History Museum. The zoo is essentially an open air experience whilst that of the museum visits occurs inside a purpose built edifice with the resultant differences in exhibit design. The more open nature and wider areas of London Zoo, compared with the enclosed museum where the same or similar species were viewed, engendered more management and social comments. The animals at the zoo were exhibited in enclosures, some of which were relatively large, especially compared with the museum exhibits and the animals chose their location, and hence often had to be searched for by the visitors. In contrast, both the dinosaurs and the preserved specimens were exhibited in clearly defined areas in both of which the specimen/model was an integral part of the exhibit which was *designed* so that the animal *could* be seen.

The site and nature of the exhibit influenced the conversational content of visitors. Exhibits are designed in the zoos predominantly with the welfare of the animals in mind and the settings in which the animals are viewed are not particularly pertinent to finding out more about the animal other than through making direct observations. Furthermore, the animals have a choice of their position in the enclosures and visitors spend time the animal and telling their companions. In contrast, the museum exhibits are designed with particular explicit messages and are constructed to maximise the viewing opportunities of the specimens which are positioned in the pose crucial for the message of the exhibit to be received by the public. Farm animals are *not* exhibited and nothing tangible is provided to interpret the animals for the visitors.

Figure 9.2, Tables 9.1 and 9.2 (and the tables in Appendix 2b) show that, within the museum, both types of exhibit, preserved specimens or animated models, engendered more content and knowledge source comments from both groups, schools and families and, surprisingly, more affective comments, than did the zoo. These data support the findings of other researchers, such as Linton and Young (1992) and Clarke and Miles (1980), that a museum is perceived by its visitors more as a site for observing, and hence learning, than is a zoo.

9.2.2 The nature of the animal specimen

An important finding in this comparative study is the emphasis placed by the visitor in their conversations on particular topics which are triggered by looking at the exhibits and which varies with the type of specimen. Most conversations that referred to behaviour, knowledge source, and affective attitudes were generated at the dinosaur models and, although the comments about body parts were similar in number at both preserved and animated specimens, the component constituents were different. The wide variety of species in the museum and zoo elicited higher numbers of comments which referred to naming and such comments were not heard within the conversations at either the dinosaurs or the farm animals where there were few species displayed. However, no group used the zoological nomenclature employed by zoo or museum except Michael's family (see Chapter 4).

When the animal being observed was *not* an exhibit, i.e. a farm animal, the proportions and thus emphasis of the conversational content differed (Figures 9.2 and 9.3). In particular, the number of conversations mentioning affective attitudes were higher (Tables 4.17 and 18) but body parts and behaviour comments were lower. The farm animals engendered more affective comments when compared with live animals or the animated models (Table 4.15) reflecting either, or both, the lack of interpretation provided for visitors to use in their conversations, or lack of educational focus, hence the reliance on their own knowledge and feelings. Such information provides evidence for visitors to evaluate when choosing the venue for their visit which most appropriately meets their needs. The results also provide the managements of animal collections with data against which they can evaluate the effectiveness of their product and to identify potential that could be developed in terms of focusing the attention of visitors on specific aspects of animals (see Tables 2, 3, 4, 5, 13, 14 and 15, Appendix 2b for site dependent data). Tables 4.11, 4.13 and 5.4 compare data for school groups at different types of specimens at different sites.

9.2.3 The visit rationale

The not unexpected finding that the visit rationale, either for leisure or formal education, affected the topics about which visitors commented is key in the future development of exhibits, interpretation and associated activities for these two large segments of visitors. Some categories of comment occurred in similar numbers irrespective of the rationale for the visits, although others were influenced by the type of exhibits, for example, the number of conversations with at least one reference to naming at the dinosaurs, Figure 9.2, was influenced by the *type* of exhibit, only three species were on show and only two were named. Figure 9.2 shows that, similar to school groups, families generated a surprising number of behaviour comments within conversations at the preserved, static animals. The inclusion of appropriate cues for visitors at exhibits would assist them in hypothesising the behaviours for the specimens in certain situations. School visits have an emphasis in their conversational content and focus on body parts, knowledge sources, other exhibit comments, affective, including emotive, comment*s suggesting a focus on these topics.*

School groups generated significantly higher numbers of comments in a few categories, particularly knowledge source, than did families. However, families generated fewer affective comments than did schools and *museums elicited more affective comments* than did the zoo animals. Farm animals (school groups) elicited far more affective comments than did similar groups at the zoo. For example, Tables 4.15 and 5.7 are examples of data which show the effect of the different type of animals, alive or preserved on the content of conversations and Table 4.13 compares the data generated by school groups at zoo animals with that at animated models. Figures 6. 1 and 6.2 show differences within the content of conversations for similar groups at museum and zoo animals and animated models.

The rationale for the visit did affect the content and form of the conversations in the museum, but disturbingly there was little difference between the zoo generated exchanges except that significantly more comments about body parts were uttered by the school groups, and school visits engendered both more affective attitude, knowledge source and animal focused comments than did those of families. Figures 6.1 and 6.2 clearly show how the difference in rationale affected the content of conversations at zoo animals. Similar information is shown in Tables 4.9 and 4.10 for preserved animals and the models for schools and families.

The purpose for which the visit to look at animals was undertaken affected the emphasis of the conversations. There is little difference between the content for school groups and those of family groups in the zoo but more so in the museum at the preserved animals. Although there were differences between the two groups at the animated dinosaurs, there was an overall similarity because of the particularly unusual and novel type of exhibit (Miles et al. 1988: 24). As discussed in Chapter 4, there was surprisingly little difference between the conversational content of school and family groups at the zoo, indicating little input by schools that affects the leisure pattern of comments at the zoo exhibits. However, in the museum, at the preserved specimens (Tables 5.1 and 5.2), school groups, but not family groups, focused on other exhibit comments, body parts, emotive comments and unfamiliar parts and on comparing animals. The school groups at the animated models focused significantly more on body parts, behaviours, knowledge source, interpretative comments, than did the families who only referred to management and social comments significantly more than the schools, reflecting their predilection towards social rather than factual comment (Figure 6.1).

9.3 THE SOCIAL COMPOSITION OF SCHOOL GROUPS

A very important finding is that the presence of an adult did make a difference to the content of conversations of school groups at animal specimens. This conclusion is not unexpected because there is a tacit assumption amongst parents, teachers and museum and zoo educators that adults do influence the conversational focus of the pupils. However, the 'adult-effect' is not similar across all categories of conversation. As discussed in Chapter 7, there was a difference in the content of conversations of groups with adults present depending on whether the adult was a chaperone or a teacher. However, the differences are not as profound as would have been expected if teachers were teaching effectively. An overview of conversational content of groups with or without an adult will be considered to elicit the effect of adults with school children. The difference in the content of conversations generated at the different sites and types of animal specimen between school groups when an adult is present, and those generated by pupil only groups, are shown in Tables 9.1 to 9.4.

Table 9.1, below, shows that groups of school children (pupils-only) looking at zoo animals, but without an adult, generate significantly fewer management and social comments, knowledge source comments and comments about behaviours, but mention other topics of conversation to a similar extent.

Table 9.1

Comparison of content of conversation generated by school groups with adults and groups of pupils-only at zoo animals (main categories)

Category	With adults n = 224 no	%	Pupils-only n = 235 no	%	$\chi_1{}^2$	Probab- ility	Phi^2
Management/social	202	90	171	73	22.84	<0.005	0.05
Exhibit access	131	59	143	61	0.27		
Other exhibit	117	52	110	47	1.35		
Body parts	150	67	130	55	6.54		
Behaviours	160	71	141	60	6.64	p<0.005	0.01
Naming	197	88	203	86	0.25		
Affective attitudes	97	43	96	41	0.28		
emotive	76	34	67	29	1.57		
Interpretative	218	97	225	96	N/A		
knowledge source	144	64	116	49	10.40	p<0.005	0.02
real/ alive	13	6	28	12	5.27		
Environment	11	5	7	3	N/A		

Table 9.2

Comparison of content of conversations generated by school groups with adults and groups of pupils-only at museum animals (main categories)

Category	With- adults n = 231 no	%	Pupils-only n = 176 no	%	$\chi_1{}^2$	Probability	Phi^2
Mngt./social	162	70	108	61	3.44		
Exhibit access	130	56	89	51	1.31		
Other exhibit	133	58	87	49	2.67		
Body parts	151	65	98	56	3.95		
Behaviours	107	46	45	26	18.39	p<0.005	0.05
Naming	203	88	141	80	4.60		
Affective attitudes	84	36	74	42	1.36		
emotive	80	35	65	37	0.23		
Interpretative	229	99	166	94	N/A		0.02
knowledge source	183	79	113	64	11.36	p<0.005	0.03
alive/dead	36	16	29	17	0.06		
Environment	32	14	13	7	4.25		

Table 9.2 shows that the presence of an adult exerted a similar effect on the content of conversations at the preserved specimens in the museum to that at the zoo, except that the presence of an adult focused conversations on knowledge source comments and on behaviours. There was no statistically significant difference in the number of conversations with at least one management/social reference but pupil-only groups generated significantly fewer interpretative comments and more affective comments

The differences in conversational content between the school groups at the animated models in the museum, which contained an adult and those of pupil-only, are shown in Table 9.3. Pupil-only groups commented about exhibit access considerably more whereas the adult-groups commented about environmental aspects. There was no difference at the animated models, as there was at the other two sorts of exhibit, in the number of conversations generated by adult-groups and pupil-only groups containing at least one knowledge source comment or reference to behaviours.

Table 9.3

Comparison of content of conversation generated by school groups with adults and groups of pupils-only at animated models (main categories)

Category	With-adults n = 247		Pupils-only n = 175		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	181	73	122	70	0.64		
Exhibit access	109	44	105	60	10.32	$p<0.005$	0.03
Other exhibit	91	37	82	47	4.30		
Body parts	181	73	126	72	0.09		
Behaviour	201	81	146	83	0.30		
Naming	115	47	61	35	5.77		
Affective attitudes	130	53	99	57	0.64		
emotive	108	44	91	52	2.81		
Interpretative	236	96	164	94	0.70		
knowledge source	205	83	134	77	2.68		
alive/ dead	100	41	70	40	0.01		
Environment	19	8	0	0	N/A		

Table 9.3 shows that the only significant difference in the number of conversations between those of pupils-only groups and groups of pupils with an adult is exhibit access which is higher amongst pupils-only groups and is likely to occur because the

pupils are drawing the attention of their peers to a novelty exhibit more so than when an adult is with the groups and apparently having a suppressive effect.

Table 9.4

Comparison of content of conversations generated by school groups with adults and groups of pupils-only at farm animals (main categories)

Category	With adults n = 85 no	%	Pupils-only n = 163 no	%	$\chi_1{}^2$	Probability	Phi^2
Mngt./social	64	75	111	68	1.69		
Exhibit access	24	28	72	44	5.98		
Other exhibit	37	44	54	33	2.60		
Body parts	59	69	90	55	4.70		
Behaviour	76	89	82	50	36.95	$p<0.005$	0.15
Naming	58	68	69	42	15.00	$p<0.005$	0.06
Affective attitudes	62	73	91	56	9.03	$p<0.005$	0.04
emotive	47	55	72	44	2.77		
Interpretative	36	42	120	74	23.41	$p<0.005$	0.09
knowledge source	62	73	70	43	20.19	$p<0.005$	0.08
alive/dead	0	0	13	8	N/A		
Environment	1	1	0	0	N/A		

The influence of the non-exhibit animals on conversational content is clear from considering the data in Table 9.4 where children interpreted the animals for themselves, largely in anthropomorphic terms (Table 16 Appendix 2b) and the presence of adults generated significantly more knowledge source questions, behaviours, and naming comment.

It is very interesting, in view of the pattern seen in Tables 9.1 to 9.4, that at the non-exhibited farm animals pupils-only groups generated significantly more interpretative comments and affective attitudes. In contrast, the adult groups generated significantly more knowledge source comments, comments about behaviours, in a similar manner to that found at animal exhibits. Furthermore, the adult-groups at the farm animals generated significantly more comments about naming than did the pupils alone. The presence of an adult with school children when viewing non-exhibit farm animals focused the conversations of the groups on behaviours of the specimens and affected the form of conversations. Significantly more knowledge source comments, statements and questions were generated.

In summary, without an adult present children focus on far fewer salient aspects of the animals. An adult gives 'added value' to a visit in terms of increased observational comments. Chapter 7 considered the differences between the two constituent groups of adults, chaperone and teacher groups, and the data showed that pupils-only groups made least comment at all exhibits. Overall teacher-groups generated most knowledge source, affective attitudes and animal focused comments, as well as environmental comments at the preserved animals; chaperone-groups generated the most management social comments and categorised and compared the animals more but their conversational content resembled more that of teacher-groups than of family groups visiting the same sites. This finding suggests that chaperones *did* modify their conversational direction when with a school group and displayed a conversational emphasis characteristic of teachers, such as high management and social comment use and higher incidence of naming and comparing animals (Chapter 7).

In view of the burden of care for the pupils carried by the adults participating in a school visit (AMMA 1989), it would have been expected that chaperones would pay particular attention to children, at all sites, as they did in the zoo where they have the highest number of management/social comments. Therefore it is surprising that conversations of the groups with chaperones in the museum at the preserved animals did not contain as many management or social references as did those of teachers (Table 7.3 and 7.5), but equally surprising that there was hardly any difference in the content for these categories for *any* of the constituent groups at the animated models, suggesting that the exhibits captured the attention of all visitors and rendered the need for management and social comment similar for all parties. The pattern of conversations of the chaperone groups, particularly at the different types of exhibits, is not consistent and this area of the differences in content of conversations amongst groups with a chaperone and those with a teacher could be usefully explored further in order that schools can devise strategies so that all pupils receive a similar conversational input about the topic they are studying at exhibits during their school trip. The influences of teacher or chaperones upon conversational content of school groups on field trips invites further study.

Previous research, e.g. that of Thier and Linn 1976, Lehman 1988, and Birney 1988, has shown that the presence of an adult affected the nature and quality of the conversation in terms of form and focus, but task demands in classroom work were largely confined to observations, (Bennett et al. 1984: 26). The content of conversations collected for this thesis were similarly confined to observations. The research reported in this thesis shows that pupils-only groups provided a significantly lower figure of exchanges that contained at least one knowledge source comment. Such information is important for schools, parents, museums and zoos in planning the school visits and evaluating the educational outcomes. The number of conversations containing at least one knowledge reference would have been expected to be similar for the chaperone-groups and teacher-groups *if* the adults were asking the children questions, or encouraging the children to generate their own, in an effort to elicit existing knowledge and to develop concepts.

The similar value of conversational elements of the knowledge source category in adult-groups, both at the zoo and at the traditional museum exhibits (Tables 4.2, 9.3), indicates that the adults did try to 'teach' the pupils. The uniqueness of the dinosaur exhibits elicited similar numbers of knowledge source observations in all groups. However, data in Chapter 7 (Figure 7.1) show that the chaperone-groups did generate more knowledge source comments than the pupils, but significantly less than teacher-groups. If chaperones had been briefed by the class teacher about the aims of the visit and the educational points, it would have been expected that the content of the conversations of chaperone-groups differed in their emphasis from that of the pupils-only groups and the extent to which the contents of the conversations for the two groups were similar at the different types of exhibits and farm animals, is surprising, reflecting a lack of educational briefing.

It is important that parents, and schools, plan with whom pupils will spend their field trip to look at animals, and that, when they are not with a teacher, chaperones are well briefed in the educational aims and tasks that the children are to do at the animal specimens. Although allowing pupils to look at animals without an adult results in fewer knowledge source comments within the conversational content of these pupils-only groups, such an experience may be part of the planned visit and be permitted in order to develop social skills for instance (Tunnicliffe 1994a), but it does not appear to promote exchange of information about animals.

9.4 COMMENTING ABOUT OTHER ASPECTS OF EXHIBITS

An interesting finding from the data analysis is that, in nearly half of their conversations (Tables in Appendix 2), visitors mentioned aspects of the exhibit *other* than the animal in broadly similar proportions, irrespective of the type of exhibit (Figure 9.2).

Table 9.5

Total number of conversations with at least one reference to 'other' aspects of the exhibit at all types of specimen - school and family groups

Type of animal specimen	School		Families	
	no	%	no	%
Zoo animals	227	50	62	43
Total conversations	459		143	
Preserved	220	54	52	28
(museum animals)	407		184	
Total conversations				
Animated models	173	41	79	45
Total conversations				
	422		176	
χ_1^2		14.65		12.62
		p<0.005		p<0.005
probability		0.01		0.03
Phi^2				

It is difficult to explain why school and family groups commented significantly less about other aspects of the models and preserved animal exhibits (Table 9.5). A possible explanation is that families focus on social interactions (Appendix 2 Table 14) and because the preserved animals are not exhibited in eye catching settings, the displays fail to catch the interest of the groups. In contrast the novelty and dramatic effect of the animatronic exhibits and the affective emotions they aroused suppressed the generation of many comments about other aspects of the exhibit.

Table 9.6

Conversations generated by school groups at the three types of animal exhibits with reference to 'Other' exhibit category

Category of 'Other exhibit'	Zoo animals 'Other exhibit' n = 227 no	%	Museum animals 'Other exhibit' n = 220 no	%	Animated models 'Other exhibit' n = 173 no	%	χ_2^2	Probab-ility	Phi^2
Setting	82	36	80	35	108	62	34.79	$p<<0.005$	0.06
Reference to labels	53	23	60	27	24	14	10.43	$p<0.01$	0.02
Direct senses e.g. mention of hearing, smell, touch	56	25	62	28	66	38	8.91		
Exhibit furniture	112	49	97	44	79	46	1.30		

Table 9.6 shows that at the dinosaur exhibit, school groups referred to the setting significantly more, probably because of the novelty and dramatic effect of these well planned exhibits and referred to the labels the least. However, only one of the two exhibits possessed them and the two identical labels were used to find the names of the specimens and their identity.

Table 9.7

Conversations generated by families at the three types of animal exhibits and with at least one reference to 'Other' exhibit category

Category of 'Other exhibit'	Zoo animals 'Other exhibit' n = 62 no	%	Museum animals 'Other exhibit' n = 52 no	%	Animated models 'Other exhibit' n = 79 no	%	χ_2^2	Probability	Phi ^{2}
Setting	22	36	21	40	40	51	3.45		
Reference to labels	14	23	6	12	6	8	6.92		
Direct observations, e.g. mention of hearing, smell, touch	9	15	18	35	17	22	6.62		

Exhibit furniture	29	47	5	10	13	17	25.72	p<<0.005	0.13

Tables 9.6 and 9.7 show that the number of conversations generated by families containing comment about constituent subgroups of 'other' exhibit category were broadly similar for the zoo and both museum specimens. However, family groups at the zoo generated comments concerning exhibit furniture significantly more that family groups at the museum animals and animatronics, referring to items to describe the location of the animals. Such references are unnecessary in the museums where the non-locomotory specimens are clearly located.

The constituent categories of 'other' exhibit comments are remarkably similar if the number of conversations are considered as percentages of the category total and not that of the total conversations. Within the constituent groups of the superordinate category of 'other' exhibit the similarity of comments is apparent (Tables 9.6 and 9.7).

Labels were rarely used, (Appendix 2. 2 Tables 9.2 and 9.3), and when they were employed they were used to find out or confirm the identity of the animal. It is suggested that few of the zoological labels that could provide information which would enhance the visitors' observations are read because for the information to be meaningful a level of technical understanding which exceeds that of the 'everyday' knowledge of the visitor is required. For example, at the time of data collection, the tigers in the zoo were labelled *Panthera tigris*. Had the label begun with a reference to 'This cat', using the basic term with which the visits might have been familiar, and continued 'is a tiger', another term used by visitors, the prospective audience for further information about the animal might have been attracted to read and use the information.

It is interesting that families in the museums generated significantly more conversations that referred to direct involvement with the animals than they did in the zoo (Appendix 2 Tables 5 and 15). A number of their comments at live animals were associated with the expectations that visitors had when encountering the different kinds of animal displayed, e.g. visitors expected lions to be hunting, not sleeping, and that all animals would be 'doing something'.

Animal exhibits are inherently of a 'look and talk' rather than 'hands-on'. Certain animal specimens in the museum did have some element of physical interaction and participation, for example some of the manufactured exhibits in the Creepy Crawly Gallery at the Natural History Museum. The actual 'dried' specimens in the Mammal Gallery and the main hall, provided visual interaction only. The animated models and many live animal exhibits provided a bi-sensory, but passive, experience for visitors (Figure 2.2). Although there were some interactive interpretative opportunities associated with some of the preserved animals on display at the Natural History Museum, they were not used in conjunction with looking at the animals, but as if they were a separate, adjacent exhibit. Visitors at preserved specimens had to work out how to participate in the display, in a manner similar to their involvement at most live animal exhibits. Without the stimulus of various behaviours to observe, describe and interpret, the visitor's focus was on body parts and the behaviour planned by the designer and 'frozen' by the taxidermist. However, such a situation could be used by educators to explore the potential characteristic behaviours of the live animals and those selected by the designers for the visitor in both museum exhibits (preserved animals and animated models) and to engineer discussion of those attributes and the formulation of explanations and the drawing of comparisons with other animals and humans by visitors.

It is interesting that the category of 'other exhibit' comments was also present within the farm conversations, and, although referring to other items in the immediate environment, but not in an exhibit, such references were coded in this category. The commenting upon such 'adjunct items' indicates that people had a need to place and position animals within the environment in which they were viewed.

Through considering the data in this thesis, a view has emerged which suggests that overall there was a particular set of items within the exhibits beside the animal to which visitors viewed. I propose to call this phenomenon the 'exhibit-looking' syndrome. People have expectations when looking at exhibits. These expectations include that the object available to be viewed is set in an interpretative context and that labels are at hand for the visitor to use if they should so wish. Visitors employ a technique for observing exhibits which incorporates looking at the exhibit furniture as well as the objects themselves and the act of displaying an object in an exhibit focuses the attention of visitors upon it. The visitors look and identify the salient features and use other aspects of the exhibit to describe the position of the object for their peers.

9.5 MOVEMENT AS AN ATTRACTOR OF THE VISITORS' ATTENTION

An important finding from this research is that the type of the specimens, be they moving, alive or animated, or static, preserved animals, influenced the conversational focus of both groups of visitors. An important conclusion drawn from the data presented in Chapters 4, 5, and 6 is that specimens which *moved* generated the most conversations. The animated models (Tables 4.15 and 4.18) elicited a greater number of conversations with at least one reference to movement than did live animals. Zoo animals (Tables 4.8 and 4.9) elicited more comments about movements than did the preserved animals. Arnhiem (1970:9) argues that movement is a powerful visual cue, hence it *should draw the attention* of visitors. Thus, exhibits, such as working models, animations of live animals in action, and active live animals, attracted visitors who noticed *changes* rather than *immobility*. It is interesting, therefore, in view of their nature, that the preserved, hence static, animals attracted the extent of comments about behaviour which they did.

Moreover, movement attracts comment on the behaviour portrayed and the body parts involved. 'Claws' are particularly part of the story told in the dinosaur diorama and were brought to the attention of the visitors through the movements of the model, hence the comments of visitors were *passive* observations. In contrast, observations about the unfamiliar parts of the preserved and static animals were *active* observations, in which visitors had first of all noticed the body parts, for they were not attracted to such parts by planned movements. Visitors either make *active* or *passive* observations about the specimens. The data show that visitors looked at the visible parts of the animal that were involved in a behaviour and it is striking that the school groups commented about unfamiliar parts of the animals e.g. reproductive, excretory organs, claws, significantly more in the museum (Appendix 2.2 Tables 2, 3, and 4).

The animated models effectively created an illusion of authenticity which gave rise to both affective comments and questions about reality, particularly amongst school groups (Figures 6.1, 6.2 and 9.2, Tables 4.13 and 4.17). These data call into question the assumption (e.g. Birney 1987, who worked with school groups, Krakauer 1994) that museums are less emotive than zoos. The anomalous dinosaur models were the animals most effective in generating comments both about their structure and associated behaviour and affective responses, suggesting that exhibiting zoo animals displaying pathological behaviour might achieve the same effect! The lack of more data on the content of conversations at other animated models means that it is only possible to suggest reasons for the success of animatronics.

There are two main areas in which explanations lie, the group of animals they portray and the nature of the exhibit. Firstly, exhibits incorporating animated animals were novel for visitors in England and novelty is a powerful attractor (Miles et al. 1988: 48) and secondly, its topic. The predictable nature of the sequenced movements, the definite movements themselves, and the very clear sequence of actions, unimpeded by extraneous spontaneous movements which may occur with living animals, are likely to be a key factor in attracting the larger number of comments on the exhibits. The biological category of animal which the models portray is extinct but has a powerful hold on children's imagination - they are 'safe' monsters.

9.6 EMOTIONAL COMMENTS OF VISITORS AS A RESPONSE TO ANIMAL SPECIMENS

A key finding from this research is that animals that move elicited more emotive comments. Shettel (1973) suggests that the emotional reaction to the exhibit *is* the experience. Of all the exhibits, the animated models had the most profound emotional impact on the visitors, hence, if Shettel's view is accepted, the animatronics provide the most effective museum experience for the categories of visitors studied for this thesis. It is also thought-provoking that visitors to the Natural History Museum generated a higher number of conversations that contained affective comments than did zoo visitors (Chapters 5 and 6 and Figure 9.2). In the category of affective comments, preserved animals elicited more emotive and doministic feelings than did the zoo animals, but it was at the animated models that visitors generated this category of comment the most (Appendix 2. 2 Tables 2, 3, 4, 13, 14, 15). Hence, to reiterate, the museum, *not* the zoo, is the place for affective comments. However, it is salutary to remember that the data show that the most conversations with at least one affective comment occurred at unexhibited animals on the farm.

An important conclusion from the data is that each location for animal exhibits elicits a distinct response in the area of affective comments. A particularly significant result from the data is that it was *school parties* at *all* types of specimens who generated more affective comments, not the comparable family groups. The school visit was an opportunity for children, and, as discussion in Chapter 7 has shown, for some of the adults, particularly teachers, to pass negative attitudes at live animals. Pupils on school trips were removed from the protective and supervisory expectation of behaviour and conversation of the family and apparently felt more able to make 'informal' noises in the zoo and farm (Appendix 2. 2 Tables 2 and 16). The higher number of negative comments passed by teachers at the zoo is striking and could be an instance of enculturation (Driver et al. 1994) into the perceived values of society regarding reactions to zoo animals. Data were not available to explore the effect of comments from particular adults on the emotional content of conversations of family groups.

The animal specimens on display in the museum were obviously both captured and dead. This topic of manifestation of human domination over the animals was raised by pupils significantly more in the museum than in the zoo (123 (30%) and 72 (16%), χ_1^2 $p < 0.005$, Appendix 2.2 Tables 2, 3, 4). The potential interaction between humans and animals fascinated many of the children in the museum and this interest compensated for the lack of observable action. Moreover, the conversations revealed a 'doministic' attitude (an urge to dominate the animal for the person's own purpose (Kellert 1979a and b; 1980;1983 and 1985) present in children, particularly amongst boys of ages seven to eleven (Tunnicliffe 1994c). Such an age-related attitude was not recorded in the surveys conducted in zoos about children's preferences for animals (Morris 1961; Surinova 1971). Furthermore, it was noticeable that children associated doministic comments with fantasies of what they would like to do with a live specimen. A year 3 child remarked at the lion in the Central Hall at the Natural History Museum,' ...it's so strong. I wish it were real then I could sit on the back and ride it, it would be really good.'. In the museum such comments as, 'Is it dangerous to me? I would like to...', 'Who killed it?', increased with age of the pupils and were significant amongst the 9-11 year olds.

It is likely that concern about conditions of animals and their rights was a manifestation of the 'stages in development', outlined by Morris and Morris (1966:172) who postulated that children began to be interested in families and caring for other beings at 7-9 years and in a wider way at the onset of puberty, when they became aware of and concerned about the rights of animals. Thus, although children in zoos could be preoccupied with other topics such as welfare and rights, such comments were rare. The focus of comments on descriptive observations of the animals may have several causes. Firstly it could have occurred because the specimens seen were novel; secondly because these visitors possessed an inherent fascination for looking at living animals; thirdly the animals immediately captured their attention and focused the thoughts of the visitors onto the animals.

Why did groups with older pupils generate more attitudinal comments? The older pupils may have been more confident at voicing their opinions. Older pupils may have possessed such attitudes to a greater extent than the younger pupils. Alternatively they were encouraged by the adults in the group, who were already familiar with the animals and used their 'conversational time budget' at the exhibit to voice their personal views. Whether or not the attitudes found in this study amongst groups of pupils who were accompanied by adults are similar to those expressed by groups of adults only is not known and the data do not provide this information.

9.7 COMPARISON OF THE CONVERSATIONAL CONTENT OF THE TWO AGE GROUPS AT THE THREE TYPES OF ANIMAL EXHIBITS

A surprising finding is that the age of the pupils in school groups, discussed in Chapter 8, had little effect on the content of conversations. An overview of the differences that did exist in the conversational content between the two age groups will be given in the following section.

9.7.1 Age group one - pupils of seven years and younger

The data can be explored to find if there is a different emphasis in content of conversation between younger and older school groups. A difference would be expected according to the age of the pupils if they were studying particular topics or observing animals with a different emphasis. Moreover, younger pupils may not be as skilled in locating particular features and need their attention drawing to them. Figure 9.4 shows that exhibit access comments were higher overall for school groups within the zoo, reflecting the need to search to locate the animals, but it is probable that adults showed the younger pupils the whereabouts of the specimens in an unostensive manner and hence such comments do not appear in the data.

Even though the zoo specimens moved, and thus it would be expected that there would be a significantly greater number of conversations from the young pupils about the body parts involved, this is not the case as the data in Table 9.8, shown below reveals.

Table 9.8

Content of conversations generated by groups with pupils of seven year olds and younger at zoo and museum animals and at animated models (main categories

Category	Zoo animals n = 293		Museum animals n =131		Animated models n =271		$\chi_2{}^2$	Probability	Phi^2
	no	%	no	%	no	%			
Mngt./social	227	78	89	68	194	72	4.95		
Exhibit access	184	63	76	58	146	54	4.63		
Other exhibit	134	46	65	50	136	50	1.25		
Body parts	179	61	78	60	193	71	8.24		
Behaviour	186	64	55	42	237	88	91.64	$p<<0.005$	0.13
Naming	260	89	112	86	119	44	153.60	$p<<0.005$	0.22
Affective attitudes	100	34	57	44	140	52	17.72	$p<0.005$	0.03
emotive	74	25	40	31	121	45	24.44	$p<0.005$	0.04
Interpretative	286	98	127	97	258	95	N/A		
knowledge source	156	53	97	74	221	82	54.56	$p<<0.005$	0.08
real/alive	13	4	15	12	95	35	94.94	$p<<0.005$	0.14

Behaviours displayed by specimens were referred to by visitors at the dinosaurs significantly more than at other types. The finding that live animals elicited significantly fewer knowledge source questions than did other specimens raises a query about the role of school visits to live animals for this age group. Table 9.8 shows that the groups containing pupils of seven years and younger focused their comments on allocating a name to specimens. Similar naming rates were found in the museum for similarly aged groups, but on that site question and knowledge source comments featured significantly more than at the zoo (Table 9.8). The data (category real/alive) indicate a concern at the animated models about their authenticity, which is not surprising because the specimens were models and secondly they portrayed extinct species. However, the data also suggest that the message of the exhibit, a simulation to show what living dinosaurs would have been like, was successful.

Table 9.9

Content of conversations generated by groups with pupils of seven years and younger at the three types of exhibit (animal observations)

	Zoo animals n = 293		Museum animals n = 131		Animated models n = 271		χ_2^2	Probability	Phi^2
	no	%	no	%	no	%			
Body parts	179	61	78	60	193	71	8.24		
front end	49	17	18	14	73	27	13.24	p <0.005	0.02
dimensions	150	51	65	50	106	39	9.03		
unfamiliar	20	7	22	17	40	15	12.39	p <0.005 0.02	
disrupters	33	11	13	10	100	37	67.71	p<<0.005	0.10
Behaviour	186	64	55	42	237	88	91.64	p<<0.005	0.13
movement	76	26	11	8	152	56	105.05	p<<0.005	0.15
position	109	37	26	20	40	15	40.07	p<<0.005	0.06
feeding	24	8	20	15	87	32	53.98	p<<0.005	0.08
attractors	74	25	20	15	123	45	45.71	p<<0.005	0.08
Naming	260	89	112	86	119	44	153.58	p<<0.005	0.22
identity	212	72	102	78	103	38	90.67	p<<0.005	0.13
category	159	54	83	63	64	24	78.14	p<<0.005	0.11
compare	118	40	50	38	18	7	91.95	p<<0.005	0.13
mistake	23	8	9	7	6	2	9.27		

Table 9.9 shows that, within animal focused comments, the message of the two animated exhibits *was* received and understood. The visitors commented significantly more on the body parts and behaviours that were shown in the exhibit, such as the head (the front end), tail and legs (disrupters) and claws (unfamiliar body parts) were involved in feeding, moving and fighting. Significantly more conversations had at least one reference to the front end of the animals, the heads moved in all specimens and the actions were very much a part of the 'story'. As noted above, the data in the Table 9.8 show that there were significantly fewer comments about the dimensions, size, shape and colour (category dimensions) at the dinosaurs than were generated at the wider variety of specimens in both the museum and the zoo. These findings emphasise the success of animated models in attracting the attention of visitors to salient features in a 'story'. The body parts and behaviours featured in the exhibits (front-end, disrupters, movement and feeding) are shown in Table 9.9 and the significant difference between the data at the three types of specimen, ranging from static to planned, predictable movement at the animatronics, reinforce the finding that

young pupils notice and comment upon salient structural features of stationary objects (Tversky 1989), movement accentuates them.

9.7.2 Age group two - children of eight years and older

The data presented in Table 9.10 show that, the number of conversations which referred to a category at least once were similar to the numbers for the groups containing younger pupils except that significantly more knowledge source comments were heard at the two types of exhibits within the museums. However, unlike the situation noted for age group 1 (Table 9.8), more affective comments were generated by the older school groups at the live animals in the zoo.

Table 9.10.

Content of conversations generated by groups with pupils of eight years and older at the three types of animal exhibit (main categories)

Category	Zoo animals n=166		Museum animals n=276		Animated models n=151		χ_2^2	Probability	Phi^2
	no	%	no	%	no	%			
Mgnt./social	127	77	181	66	110	73	6.49		
Exhibit access	105	63	143	52	93	62	6.94		
Other exhibit	93	56	155	56	71	48	3.74		
Body parts	101	61	165	60	116	77	13.65	$p < 0.005$	0.02
Behaviour	115	69	97	35	126	83	107.07	$p << 0.005$	0.18
Naming	140	84	232	84	57	38	122.48	$p < 0.005$	0.21
Affective atts	93	56	85	31	49	33	30.83	$p << 0.005$	0.05
emotive	68	41	105	38	78	52	7.54	($p < 0.025$)	
Interpretative	157	95	268	97	142	94	2.77		
knowledge source	98	59	199	72	118	78	14.85	$p < 0.005$	0.03
real/alive	8	5	47	17	30	20	17.46	$p < 0.005$	0.03

It is not entirely unexpected that older school groups at the zoo generated significantly more affective attitudes because of a heightened interest in affective attitudes to live animals that has been observed in pupils of this age group of 7 to 12 year olds (Kellert and Westervelt 1982: 188). However, the groups in the museums, at the static preserved specimens and at the animated models, two types of exhibit which have a very different message and style of presentation, had similar proportion of conversations with at least one affective comment amongst them.

The data in Table 9.10 and Table 9.11 show that significantly more of the members of groups containing older pupils mentioned body parts and behaviours at the animatronics, but uttered less naming comments at the other exhibits. Moreover groups with older pupils, like those with younger pupils, generated significantly fewer comments about the 'aliveness' of the specimens at the zoo than at the other two types of exhibit.

Table 9.11

Content of conversations generated by groups with pupils of eight years and older at the three types of animal exhibit (animal observations)

Category	Zoo animals n=166		Museum animals n=276		Animated models n=151		χ_2^2	Probability	Phi^2
	no	%	no	%	no	%			
Body parts	101	61	165	60	116	77	13.65	$p<0.005$	0.02
front end	28	17	49	18	40	27	5.90		
dimensions	87	52	136	49	67	44	2.07		
unfamiliar	12	7	45	16	19	13	7.65		
disrupters	24	15	26	9	60	40	66.73	$p<<0.005$	0 11
Behaviour	115	69	97	35	126	83	107.07	$p<<0.005$	0.18
movement	54	33	29	11	97	64	133.81	$p<<0.005$	0.23
position	68	41	43	16	40	27	35.30	$p <0.005$	0.06
feeding	30	18	8	3	40	27	52.44	$p<<0.005$	0.09
attractors	49	30	33	12	59	39	43.79	$p<<0.005$	0.07
Naming	140	84	232	84	57	38	122.48	$p<<0.005$	0.21
identity	106	64	195	71	44	29	72.18	$p<<0.005$	0.12
category	61	37	149	54	22	15	64.12	$p<<0.005$	0.11
compare	62	37	116	42	17	11	43.96	$p<<0.005$	0.07
mistake	10	6	14	5	00	00	N/A		

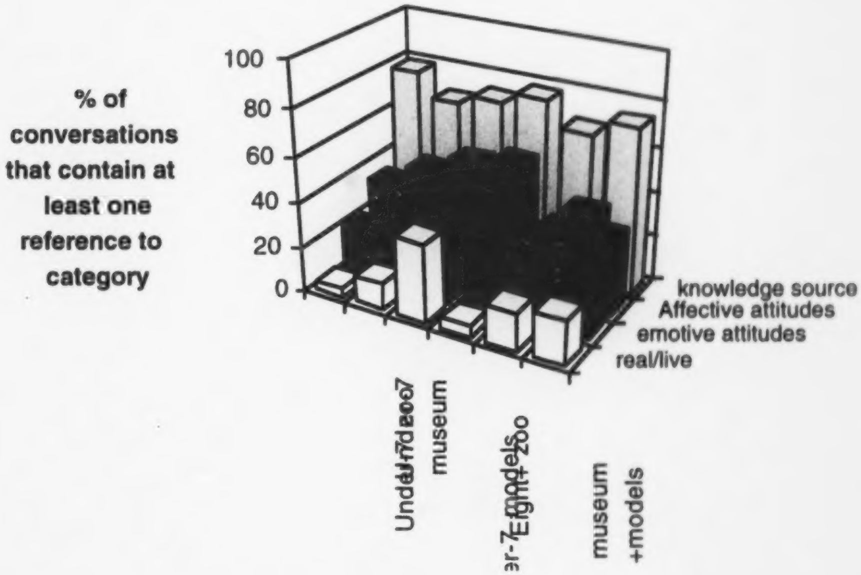
The data presented in Tables 9.10 and 9.11 shows that, as for groups containing pupils of seven and younger, animal specific comments generated by members of the group containing older pupils varied significantly according to the type of exhibit observed. The groups looking at dinosaurs commented significantly more about the animal related topics, body parts (not the case with age group, Table 9.8) and behaviour and, not unexpectedly, named the specimens the least, reflecting the pattern in the overall data presented in Chapter 4.

9.7.3 Overview of age related comments

The content of the conversations at all types of exhibits generated by the groups containing pupils of seven years and below or eight years and older is shown in Figures 9.3 and 9.4 to be strikingly similar. The differences were caused, *not* by the age of the pupils within the group, but by the nature of the exhibits and the responses to these (Chapters 4, 5, and 6). Such exhibit influences and the differences which are apparent within the data have been discussed in the relevant chapters.

Figure 9.3

Content of conversations at all animal exhibit sites of groups with pupils of seven years and under compared with that of groups with pupils and of eight years and over (Narrative comments)



Figures 9.3 and 9.4 show that there was remarkably little difference between the two age groups at the three types of animal exhibit in the number of conversations that contained at least one comment about the main categories. If the data in Figure 9.3, gathered in the zoo and at traditional museum animal exhibits, are considered, there is

clearly a higher rate of knowledge source comments for both age groups generated in the museum at the preserved and animatronic specimens than there was in the zoo at live animals. The discrepancy in the overall number of conversations with affective comments between age groups is also clear. Groups containing pupils of seven and younger generated more affective comments at both museum animals and animatronics and groups containing pupils of eight and above made more affective comments in the zoo (Tables 9.8 and 9.10).

Figure 9.4

Content of conversations generated at all animal exhibits by groups containing pupils of seven and undercompared with that of groups with pupils of eight and older (animal observations)

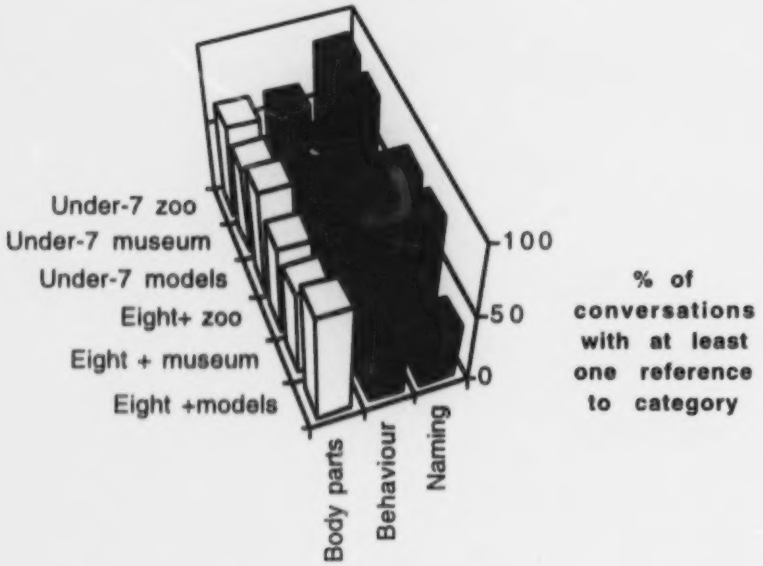


Figure 9.4 displays the data obtained for animal focused comments at the three sites and shows the similarity in occurrence of naming and body part comments between the zoo and the traditional museum specimens. Surprisingly, even though the traditional museum specimens are static, a high number of conversations related to behaviour of the animals was heard which is similar in proportion of total

conversations for the two age groups, but are still the smallest values compared with that for the other two types of animal exhibit.

Groups from both age ranges commented significantly more at the models about behaviour and movement. It is interesting that, within these two categories, groups of older pupils, whilst commenting overall significantly more about body parts than did the groups containing seven year old pupils and younger, passed more comments about disrupters, parts of the body that 'stick out' such as legs and tail. A similar high number of comments about 'disrupters' was noted for the groups containing younger pupils. Such a finding must be because the movements of these parts caught the attention of the pupils and satisfied an interest, for movement per se was mentioned significantly more at the animated dinosaurs where the animals did not locomote, but moved parts of their bodies. Feeding behaviour was, not unsurprisingly, highest at the dinosaurs where carnivores eating a herbivore was part of the message of the exhibit and told through the actions of the models.

The categories for which the number of conversations were significantly different are summarised in Tables 9.12 and 9.13.

Table 9.12

The categories of conversation generated at live animals and the content of which are significantly different between the two age groups

Zoo animal s (Tables 8.1, 8.2 and 8. 3.)		Farm animals (not exhibits)(Tables 8.8 and 8.9)	
Younger Age Group	Older Age Group	Younger Age Group	Older Age Group
1. Feeding and related behaviours	2. Affective attitudes (including motive of which D-comments and D- noises are significantly higher)	1. Movement	2. Position of animals
2. Categorising animals			

Table 9.12 shows that groups with younger pupils looking at zoo animals focused significantly more on feeding behaviours and categorising the animals whereas movement was the category that was commented about significantly more by groups with younger pupils looking at farm animals. Groups containing older pupils and

which looked at zoo animals commented significantly more about affective attitudes and those looking at farm animals mentioned the position of the specimens the most.

Table 9.13

The categories of conversation generated at museum animals and animatronics and the content of which is significantly different between the two age groups

Museum animals (Tables 8.10, 8. 11 and 8.12)		Animated models (Tables 8.6 and 8.7)	
Seven years and younger	Eight years and older	Seven years and younger	Eight years and older
1. Feeding	1. Affective attitudes especially human animal interaction (will it hurt me? I'd like to ride that)	1. Alive/dead	
2. Interacting with exhibits - touching, hearing			

At the two different types of animal exhibit displayed within the Natural History Museum, as the data in Table 9.13 shows, the groups with younger pupils looking at museum animals also commented the most about feeding but also mentioned the possibility of interaction with the animals, not giving a category name to the specimens as similar groups did at zoo animals. It is interesting to note that the groups of visitors containing older pupil commented significantly more about affective attitudes at the museum animals as they did at the zoo animals. The animatronics elicited significantly more comments about authenticity.

Tables 9.12 and 9.13 show the categories mentioned the most at the three types of animal exhibits and at farm animals so that conclusions about the particular age related interests at these animal specimens can be drawn. In the older age group, as in the younger ones, there was a surprising similarity in the categories of conversation not focused on the animals, except for knowledge source comments which was significantly lower within the zoo (Appendix 2b Tables 2, 3, 4 and 16). A possible explanation for such a finding is that it reflects the predisposition amongst the visitors toward the different sites in respect of learning or leisure and associated expectations for the visits. A striking finding is that younger pupils commented more about feeding and uttered more affective attitudes at the animatronics than at live animal exhibits. Conversely, groups with older pupils uttered the highest proportion of affective comments at the zoo and at the animated models. These results reinforce the conclusion from Chapter 4 and 6 that visitors' observations made at dinosaur models focused on the salient features and behaviours incorporated into the exhibit design and that these features successfully attracted the visitors' attention, with ensuing comment.

It is a very important finding from this research that there was a general similarity of the results across the two age groups for the school data. If the pupils were studying age related work one would expect a different emphasis in zoological observations at different age groups. The requirements of the National Curriculum and the development of the pupils would, it was thought, have engendered more pronounced differences in the emphasis of conversational content between the two broad age groups *if* they were set educational tasks. The lack of differentiation is of concern when considering the educational entitlement and provision of the primary school pupils and the efficacy of field trips in delivering this.

An equally important finding is that visitors, school groups or family groups, looking at animals as exhibits, be they live, preserved or animatronic, commented about the same salient features of the animals and referred in similar proportions to other aspects of the exhibits. Such information provides educators and exhibit designers a basis on which to build future exhibits and interpretative material. Exhibits and interpretation could start with what the visitors notice and lead them into making related observations about features which are part of the story that the designers and educators are using the exhibit to tell.

Summary

The data presented in this thesis, of which this chapter contains an overview, provide answers to the research questions posed in Chapter 3.

Groups of visitors looking at animal specimens in different locations comment about a similar range of features (Question 1). The data show that, although the topics discussed are similar, the emphasis of the dialogue between visitors is influenced by the nature of the specimens, alive, animated models or static specimens, and the site, zoo, museum or farm, in which they are seen (Question 2).

Social factors have been shown, from the analysis of the data, to influence the content of the conversations. The rationale of the visit, a family leisure outing or a formal school trip affects the emphasis, with school groups focusing more on particular topics, and generating more knowledge source and affective comments. The age of the school pupils within the school party affects the proportions of the content of the conversations ***unexpectedly little***. However, the presence of an adult with a school group focused conversational content onto particular features of the animals and generated more knowledge source comments. If the adult was a teacher, higher proportions of animal focused and knowledge source comments were generated than if the adult was a chaperone. However, the content of the conversations of chaperone-groups was more like that of teacher-groups than family groups, indicating that chaperones did try to assume the mantle of the teacher when in charge of school pupils and modelled their conversations on what they perceived that of teachers to be (Question 3).

The data show that the educational mission of the institution displaying animal exhibits was being fulfilled to a limited extent. Although museums and zoos cite education as part of their mission, the message inherent in the exhibit did not appear to reach the zoo visitors who made observations and used their existing knowledge to interpret the animals. Similar conversational content was found in the museum visitors but some messages from the preserved animals reached them. The most successful exhibits in terms of their story being received by visitors were the animated models. Not unexpectedly, farm animals were interpreted mostly with affective comments and lower proportions of animal observations than the exhibited animals (Question 4).

CHAPTER 10

IMPLICATIONS AND RECOMMENDATIONS

This final chapter I consider the implications of the research and make recommendations for future action with particular reference to zoos.

10.1 ACHIEVEMENTS OF THE STUDY

This study has collected a large body of data from different groups and in different sites at various types of animal specimens. The analysis of this data provides an insight into a large number of aspects of the interactions of these visitors with the exhibits and provides a basis on which future educational work at animal exhibits formal and non-formal, can be developed. Furthermore, the data provide an interesting insight into the reactions of primary school groups to animals that are not exhibits. However, the analysis of data shows that there is still a great deal of work to be undertaken in understanding the content of the conversations of these groups of visitors and the influences that have been shown to affect them and could usefully be extended.

The data provide an insight into the content of conversations of two categories of visitors, primary school and family groups, but, with the exception of the Michael data (Table 4.4), the transcript of which is presented as the Prologue, the data does not provide an insight into the different content of conversations and its form that may occur during the *totality* of a visit. The data were not collected from groups at the same time into their visit nor was the same number of exchanges collected from each different school groups. The data collection had to be flexible and follow the wishes of the teacher in charge for the school groups. Although some exhibits were popular and data could be collected by positioning myself in front of that exhibit and waiting until groups stopped, I had to know the identity of the school groups for the demographic data and it proved easier to accompany the groups on their walks through the exhibits. Rosenfeld (1980:19) noted, that if visitors knew they were 'subjects', they were likely to act, and hence talk, differently from normal. Families were far more difficult to listen to because they were small units and I walked around the more crowded exhibit areas stopping behind families at exhibits.

Some problems did arise during the work. The technique of data collection had some inherent difficulties and the analysis technique chosen for this thesis did not provide an overview of the total responses of visitors to the animal specimens. The technique did not capture the physical behaviour of visitors. The data provided snapshots into one particular response to animals, the conversations generated at the animal specimens. The data did not contain any conversations that were generated whilst the visitors were between exhibits, nor does the data reveal the type of preparation that had been made for the visits nor work done referring to the visit experience when the site had been left. The data does not indicate whether learning was occurring at the exhibits, it only informs us on what topics the visitors chose to comment. Furthermore, lack of verbalisation by groups resulted in no data being collected, although there was an evident response to the exhibits. This non-verbalisation response was particularly evident amongst family groups at the animatronics.

The type of data recorded and the sites at which this was done provided a number of variables that make the resulting data difficult to handle in terms of comparisons. However, the data provide a snapshot of the content of conversations at animal specimens and an introduction for further more focused studies on aspects referred to in this thesis. There is no other study that has looked at two different social groups within different settings but looking at animal specimens.

10. 2 DISCUSSION OF STUDY

10. 2.1 Conversations at animals

The data have shown that topics of conversation at animal exhibits are affected by a number of factors which include:

- an inherent way in which people look at items presented to be viewed;
- an intrinsic human need to learn the name of something (Markman 1989: 21) and categorise objects (Bruner, Goodnow and Austin 1956: 6);

- a response by people to the naturally occurring patterns that exists in the world (Gibson 1979);
- commenting to others, when visiting in a group, upon particular attributes that capture their attention ;
- the influence of different ambience inherent within various sites, museum or zoo or farm;
- the expectations of visitors for behaviour and visit focus;
- the responses to the different kinds of animal, i.e. live, preserved or animated models;
- the differing rationales of visitors - formal education visits would have been expected to provide a pronounced affect on conversational content;
- the potentially different experiences for visitors provided by zoos and museums;
- the interests and experiences which each visitor contributes to their visit experience.

The similarity of the conversational content reported in this thesis is therefore surprising. Both the pattern and forms of conversations are particularly noticeable within the transcripts. Talking about both the overall exhibit and specimens were the most frequent topics of conversation, with visitors constructing their personal narrative to explain what they saw, not using that of the zoo or museum, except at the models. Although this thesis focuses on the *content* of the conversations, its *form* is important, particularly for school groups where active teaching and learning was expected to occur.

The form of conversations typically generated at the exhibits is a midway between the dominant teacher led dialogue of the classroom, identified as triadic dialogue by Lemke (1990: ix), where the teacher initiates the dialogue and asks most of the questions, and the situation in the home where the child instigates most dialogue with information seeking questions, largely 'why' (Tizard and Hughes 1988), thus forming an inverse triadic dialogue (Appendix 4). There are however few 'why' information seeking questions in the transcripts of this research. The dialogue focus is on 'what' which may be a reflection of the type of interpretation proffered in the collections (McIntosh 1992). There is little evidence of ideational thought, merely experiential (Halliday 1980). The museum and zoos appear to create a conversational 'half-way house' for both children and adults, especially in school groups. A distinctive 'exhibit' pattern of dialogue is seen beside those of 'talking to teach' with adults telling or questioning children and 'talking to learn' where children seek information.

10.2.2 Attending to exhibits

In the transcript of the visit to the zoo of Michael and his family, which is reported in full in the Prologue, it is apparent that *all* the conversations refer to exhibits. The other transcripts, of primary school or family groups, which I analysed for their content, show that visitors talk about exhibits when in front of them. This is an important observation for visitor studies and supports the view of McManus (1987: 257) that visitors talk about the exhibits when attending to them. Moreover, there is a commonality in the content of such conversations, whether they are generated by school or family groups, and made at any type of animal exhibit, preserved, animated model or live. Not unexpectedly, conversations containing interpretative comments were lowest in school group on the farm where there was no overt message for visitors because the animals *were not exhibited*.

Analysis of the data (Figures 9.1 to 9.4) suggests, and reinforces, the conclusions drawn from the Michael data, that there is a definite and inherent pattern in the way in which visitors look at animal specimens and to the features of an animal that they notice. The results presented in this thesis show that the conclusion of Cone (1978), that learning from exhibits is largely one of direct observation accompanied by explanation from visitors to each other, particularly parents to children, holds for animal exhibits and for adult-pupil interactions. Visitors use an inherent agenda and talk about the basic attributes which are:

- the salient dimensions of the animal, e.g. size, shape, colour;
- the behaviours that are perceptually clear and that attract attention through movement.

Furthermore, other aspects of the exhibit are mentioned in similar proportions (Tables 9.5, 9.6 and 9.7). Such a pattern of viewing and commenting may be associated with *any object and exhibits* and not be specific to animals.

By contrasting the data collected at animals as exhibits with that from non exhibit (farm) animals, it is evident that the former have an effect in focusing the attention of the visitors on distinctive features in the exhibit, particularly of the animals. Furthermore, focusing the attention of visitors on specific behaviour and structure, as the animated models do, ensures that the visitors receive more of the message than occurs at either the preserved animals or the live exhibits. It is a salutary thought that such models with repeated, predictable actions are similar in nature to captive animals displaying stereotypic behaviour.

10.2.3 Naming animals

Naming specimens was the predominant animal focused comment at the preserved and live animals, and, considering the paucity of species at the dinosaurs and on the farm, naming comments occurred in a substantial number of all conversations (Figure 9.3). This observation reinforces the view that human beings have a need to 'identify and categorise objects in the their environment' (Bruner, Goodnow and Austin 1956: 5). Although, as data and discussion in Chapter 4 showed, the categories of visitors studied in this thesis did not use the scientific, and hardly ever employed the common name for the animal, but applied the vernacular name, usually the basic term (Cameron 1994) to the specimens. The vernacular names range, in terms of zoological taxonomy, from the specific to that of the phyla, although that of genus level, as Berlin (1973:1978) found, is the more frequent (Table 4.11) but not the exclusive zoological level of name. Visitors did not categorise within taxonomic hierarchies but allocated animals to horizontal groups or collections (Markman 18989:78-84) using particular diagnostic attributes of function e.g. pets' corner, farm animals, or form e.g. snakes (long animals with no legs and body sections). Frequently visitors encapsulated within the identity of the animal e.g. 'goat', the category term, 'goat'. Occasionally visitors provided two different and accurate terms at different taxonomic levels for the same animal, for example, 'It's a cobra, that's snake', could indicate that the speaker had some understanding of zoological classification.

The majority of primary school and family visitors named the animals by reference to family resemblance (Markman 1989: 9).Visitors applied their everyday knowledge to work out whether or not an unknown specimen was probably a member of a certain category, for which they held an exemplar, because it possessed salient features, irrespective of whether the categorisation was accurate in zoological terms. Children were assisted in naming by the adults who accompanied them, and in some instances, by the museum or zoo. Irrespective of the nature of the animals, alive, preserved or animated model, the public possess an inherent and functional taxonomy for animals, which is not a hierarchical classification but initially a graphic collection system, e.g. big animals, progressing to a non-graphic collection in which participatory animals share a classification feature, snakes have no legs, reptiles have scales, (Inhelder and Piaget 1964), employing everyday names. Hence 'monkeys', 'cats', 'snakes', 'birds' and 'fish', are the terms employed in this basic naming system. However, there is no spontaneous development of, or use of known, superordinate categories such as reptile or mammal, and whilst on a few occasions a subordinate term is used, e.g. Blue Whale, such usage is relatively rare and often associated with label use. Effective interpretation, at the level of the understanding of the visitor, employing their familiar terminology, could assist in their learning the scientific terms and further relevant background information, starting at the topics which interest them, *not* the institution.

10.2.4 Attributes of animal mentioned by visitors

Being able to both name an animal and allocate a specimen to a relevant category means that the person making the identification can recognise the appropriate defining attributes necessary for membership (Smith and Medin 1981: 4). This ability is largely learnt as part of everyday life, but zoological categorisation *can* be taught. Visitors commented on the salient features beginning with size, shape and colour and unusual, striking features of the animals. The features enumerated match those that children commented upon within classroom investigations to ascertain the designating features of 'animals.' The basic observations made by visitors at animal exhibits and commented upon could be built on by teachers and institutions to develop a learner's understanding of the animal specimens. However, the institutions are not providing effective interpretation that assists visitors in developing their existing concepts. Children group objects that share salient parts faster than other objects and identify such parts within an object, especially shape or large parts (Tversky 1989), and look for size as one of the first characteristics of an object (Inhelder and Piaget 1964: 101). Although the adults may comment on such salient parts for the benefit of the children, it is more likely that these features are also those first noticed by non-zoologists. In other words, the attributes mentioned form the basic level of referring to animal, an 'everyday science', in contrast to scientific observations of critical attributes, not necessarily salient, required in zoological taxonomy. This is an important point for zoos and museums to consider if they are serious about providing accessible information for the majority of their visitors.

Classroom research has shown that children differentiate between animals by using conspicuous external characteristics (Trowbridge and Mintzes 1985; 1988; Mintzes, Trowbridge et al. 1991) and that, when asked what features define animals, primary school children commented on a variety of attributes and mention in particular appendages. Bell (1981) found that locomotory appendages, body coverings, habitat, size, ability to move and possession of sense organs were cited by children in classroom tests as characteristics possessed by animals in general. Although a difference may be noticeable in the detail of attributes commented upon, it appears that similar conspicuous features are referred to by children when asked to define an animal using drawings or specimens as they are when the children are observing an authentic specimen, alive or dead. Animals possess certain attributes that observers observe and mention, whatever the situation or form in which the animal image is observed.

Attributes may be more easily observed and recognised in certain types of specimens. Furthermore, the groups under formal education auspices are likely to focus more on recognising animals and citing their defining attributes in a group with non-formal educational tasks or rationale. It is surprising therefore that there was little difference in pertinent content between the exchanges generated in the zoo, except that significantly more comments about body parts were uttered by the school groups, and overall school visitors engendered both more affective attitude, knowledge source and animal focused comments than did families. It is, however, not surprising because of the very different nature of the types of exhibits and animal specimens that they embrace, that within an overall similar framework, there were significant differences in the content of conversations that focus on the animals between the two sites and the three types of exhibit. Observations about all body parts, but significantly the unfamiliar, are more readily observed in the preserved/static specimens and animated models than in live ones. Contrary to popular belief, groups containing school children neither talked about some of the constituent organs that belong to this category (e.g. excretory organs) without directly viewing them, nor appeared to possess an active policy to seek them out.

The extent to which the groups talked about the behaviour of the preserved specimens exhibited in the museum is surprising, but indicates the potential for skilled teachers, if they have the requisite knowledge, in drawing the attention of children to specific parts of the body and behaviours with which they are associated. The similarity in the number of conversations at the preserved/static specimens and animated models referring at least once to the position of the animal is interesting because both specimens are positioned in a definite place from which they do not move. The similarity in number of conversations between the live and static animals containing at least one naming comment is not surprising because of the similar wide diversity of species amongst the specimens. However, the significant difference in the number of conversations that compared the animal at least once with another animal, human or other artefact in the museum, suggests that school groups looked more carefully at the preserved animals. Such visitor behaviour is likely because the preserved specimens are easy to see and a number can be seen from one place. Furthermore, a greater range of specimens are available within a short distance within the museum, unlike the zoo situation where individual animals are located with greater distances between them with more extraneous features within the enclosures such as vegetation. However, most comparisons at the traditional museum specimens were not made perceptually, with other specimens that are located nearby, but conceptually, with the self or recalled images of animals and objects.

10.2.5 Influences on conversational content of the site where the animals are seen

The nature of the exhibit in the museum renders the observation of salient features easier, as the above section discussed. However, the influence of the different sites where animals were observed has a more extensive influence than just that of the nature of exhibit. Traditionally children are taken to such places, zoos and museums, to further their experiences related to animals. Increasingly children are taken to visit farms which do not seek to interpret the specimens to the same extent as the museums and zoo; the farm where the children whose conversations were analysed neither provided labels nor accessory interpretation devices. Visitors do not view animals in isolation. Other aspects of the exhibit were important to the visitors, and the opportunity to interact directly and comment about direct interaction were more prevalent within the museums at the static animals. Furthermore, the children looked at the animals in the utilitarian working farm surroundings, which convey the implicit message about the role of animals in human needs. The emotional impact of exhibits was greatest within the museum but the non-exhibit farm animals elicited the highest number of affective comments but fewer in the other categories. In the absence of planned exhibits and educational tasks, affective comments appeared to be the major emphasis of the farm conversations but the similar rate of conversations with at least one 'other exhibit' comment reflects the view that visitors do not look at any animal in isolation from its environment.

The data summarised in Figures 9.1 to 9. 3 reflect the findings of earlier Chapters, 4 to 8, and reinforce the view that museums are a more appropriate place and effective place to bring primary school children to observe and learn about animals and that the animated models, replicating stereotypic behaviour of living animals with their repeated sequence of actions which children can learn and then predict the next action, are the most effective way of drawing the attention of visitors to specific behaviours and associated structures. However, the behaviours and structures are limited to those being displayed by the models, whereas skilled teachers could draw observations about other aspects of animals using the preserved specimens.

The content of conversations generated by families was anticipated to be different in proportion, but similar in overall topics to those of school groups because of the different rationale for the visits. The data considered in Chapters 4, 5, 6 have shown that, in the museums, the content of the conversations of families in the museum, whilst similar in categories, was different in emphasis from that of schools. Schools observed a greater proportion of attributes and generated more affective comments. However, there was unexpectedly little difference between the proportions of conversations about the same topics of the two groups, family and school, in the zoo which should be a finding of some concern to zoos that actively promote curriculum focused learning for school groups within their collections. For, apart from looking overall significantly more at body parts, there were no other significant differences (Figure 9.1).

Although practically all conversations at all the exhibit types contained at least one reference to interpretative comment (Appendix 2b Tables 2, 3, 4) it is striking, but not surprising, in view of the nature of the animal specimens, that significantly more conversations at the dinosaurs referred at least once to the realness or aliveness of the dinosaurs (Appendix 2b, Tables 3 and 15). There was a significantly lower number of knowledge source questions in the zoo. This finding possibly reflects the general distinction drawn by visitors as the museum as a source of culture, artefacts and knowledge and the leisure emphasis inherent in a zoo visit (Linton and Young 1992).

The ethos of the traditional museum, the nature of the specimens, and type of exhibit influenced the generation of affective comments. School groups generated similar numbers of affective comments at preserved and live animals. Families on the other hand, who looked at preserved specimens, generated more affective comments than those in the zoo. However, overall most affective comments for both groups were generated at the animated models (Appendix 2b Tables 4 and 14 and Figure 6.3). This finding could provide the zoo with a basis for developing interpretative approaches particularly with family visitors in mind, for, whilst family zoo visitors were not over-concerned to any great extent with affective comments, they questioned and make declarative statements (knowledge source comments) to the same extent as did school zoo groups (Table 5.1).

10.3 IMPLICATIONS AND RECOMMENDATIONS OF THE STUDY

The data from the research presented in this thesis enables the extent to which viewing an animal exhibit is 'enlightening' to be considered and whether the messages explicit in each exhibit both reach and are understood by the school and family visitors. Both the museums and zoos, and the teachers who bring children, are involved in formal education. We need, therefore, to consider the effect of the teachers, those who visit and those who have an input into both the interpretation and design of the exhibit and the identification of the intended story that an exhibits is designed to communicate.

Most previous studies about visitors and animal specimens have been conducted within one setting, museum or zoo, hence it was not known how much of the data gathered is contingent on the setting. Previous studies have been set within one social context, family leisure groups *or* school groups and it was not known how much the results reflect the rationale for the visit, rather than the setting. My study shows, contrary to prevalent professional assumptions, how little the nature of the experience differs in supposedly diverse settings, with the ages of children and the rationale for the visits.

To what extent can the results be generalised? This research project set out to provide answers to particular questions by looking at conversational content generated at animals in several contexts with a tacit expectation that there would be big differences between data gathered at live animals and at museum specimens. Moreover, it was expected that more museum visitors would extract the cognitive story from the traditional exhibits and that zoos would engender more emotive responses from their visitors. There exists a surprising similarity in the data, both between families and school, between museums and zoo, and between the two main age groups of children within school groups. However, within the overall similarities there are some important differences. If the story told by the exhibits depends on an ability to observe closely, and, if we want to guarantee that facts are comprehended by visitors, then it would appear the museum, with its traditional, preserved specimens *or* animated models, is the place to visit.

*10.3.1 Zoos and museums **are** different - a role for zoos*

Zoos do not educate through well articulated exhibits. Their animals are almost independent of the exhibits, which are frequently not designed with the transmission of explicit messages in mind. Zoo exhibits reflect this ad hoc relationship between the space in which the animal is kept and the structure, type and behaviour of the specimens. Zoos are concerned with their mission of creating a conservation ethic but the data show that interest in this aspect is more apparent within the traditional museum.

It is surprising that the status of the visitors, school teacher or parent, within school visits has hitherto been unexplored in relation to the content of the conversations of visiting groups because the adult is influential in directing the attention of children to aspects of the exhibits. Their influence affects what the children notice. Furthermore, visitors displayed an inherent way of looking at animal exhibits that may be found at other types of exhibit that focus on other categories of objects.

Zoo managements overlook the fact that visitors cannot experience the magic of most living animals and their behaviours. Surprisingly, the data show that the animated models can create such an impression for a very specific behaviour and that the static specimens generate a surprising number of comments focused on the behaviour in which the specimens are portrayed within their exhibit. Zoos need to bear in mind the aspects of the exhibits discussed above about which their visitors comment.

If zoos are to be justified other than as closed breeding centres for endangered species, they must rethink their action plans. Zoos cannot be treated as museums, not should they aspire to be 'living museums' (IUDZG 1993:5), but they should capitalise on their special attributes and complement the museums. Zoos should present exhibits and information that museums can not do so easily. Zoos should not do what museums do best. They should do what zoos *could* do best. Zoos are costly. How can we strengthen the living collections to emphasise their mission of conservation and education as well as interest their visitors and extend their knowledge and understanding of animals? Zoos need to start 'where their visitors do' and help tell a story in which the visitors have an intrinsic interest so that they will receive and comprehend the zoo's messages. Zoo and museum management could use the data obtained from this research as a 'reality' check against their objectives and targets for their exhibits by listening and analysing the conversations of their visitors and comparing that with the findings presented in this thesis. Visitors need to learn about animals and their needs, their natural habitats and adaptations to them, the food chains and their place in the ecological web of meat eater, plant eater, energy capturers, *before* they are able to comprehend the ideas inherent in the conservation of endangered species because they are the key notions required for people to understand the concept of biological conservation.

The data collected for this thesis show that visitors, adults in particular, are overtly interested in the behaviour of the animals. It would be more effective to have relevant and effectively interpreted exhibits in zoos that referred to the animals by the term most often used by visitors and explained the behaviour that the animals, typically, portray. For example, the lions, in a manner reminiscent of the domestic cat, sleep most of the time. Additional information presented at the exhibit that drew the visitor into the topic through referring to their own knowledge, understanding and experience of domestic cats, could successfully make the visitor feel part of the story, not alienated by the science and topics presented in which most visitors have no interest, nor understanding, nor mastery of the vocabulary employed.

Zoos must change. They must help visitors learn the subtleties of animal biology. They should focus their interpretation on the basic categorisation and identity categories which visitors employ to refer to the specimens and guide visitors to observing the similarities and differences between category members. Only when the fundamental concepts of animal science have been acquired can the visitors be told the story of biodiversity which leads into conservation. Visitors receive messages about exhibits which explain what is occurring at that point in time and provide information which enable the visitors to actively construct meaning (Kelsey 1991). Moreover, as Kelsey showed, a shift in interpretation from human-dominated perspective to an interconnected view of life helped the visitors 'see the ecological perspectives of wild and captive killer whales'. A similar constructivist approach of conceptual challenge which guides the interaction of staff with visitors is likely to achieve such an objective for other species.

Zoos need to broaden their patterns of interpretation from the few seconds 'glimpse into the life of..' that exists now to explaining, through using modern exhibitory techniques, such as video and immersion experiences, what behaviour, or lack of it, the animal is involved in and the significance of these activities within the overall behavioural pattern. For example, the already employed technique of reversing or rephasing of circadian rhythm, so that nocturnal animals are alert during the visit times, enables visitors to learn about the activities in which such animals are involved and the patterns of their day. Zoos should extend such techniques and provide an overview of the life and activities of the animals - not snapshots, through the interpretation provided for visitors. Furthermore, endangered species are not necessarily the appropriate animal to display and zoos need to assess the public understanding potential of animals when making their choice of exhibits because animals more relevant to the public are more powerful in meaningfully catching the attention of visitors.

10.3.2 Education at animal specimens

10.3.2a Learning strategies observed

The data suggest that the public have little understanding of either the biology of animals or of how to observe them scientifically. Whilst families visit predominantly for leisure purposes, the majority of schools are ostensibly undertaking their visits for educational purposes of a curricular as opposed to a social nature. Data suggest that there was more focus on animal specimens within the museums, especially at the animated dinosaurs but that observations rarely developed further than everyday comments, which noted the salient features (Tversky 1989). Visitors observing any animal specimen did not find and recognise patterns, a key process in learning biology (Honey and Paxman 1987) or use their observations to construct keys or to identify animals through using them, both important skills of biology (Tilling 1984). The outcomes of school visits to the museum and zoo, indicated by the content of the conversations studied in this thesis, are disappointing, particularly the apparent lack of difference in the focus of the conversations of the two age groups considered. The children were involved in generating commentary about their observations: they were not constructing hypotheses, making predictions, and observing in the light of these. Children are not asked to make predictions based on a set of observations made in the collection, or on previous work carried out in school, and then in turn find out from further observations whether their prediction is valid.

The overall impression gathered from the transcripts and data in this present study is that school groups were not 'talking science' (Lemke 1990: ix), they were 'talking everyday' - making observations and grouping objects and both children and adults named the animals from their existing knowledge of family resemblances. Although a difference was noticeable in the detail of the attributes commented upon, it appears that similar conspicuous features were referred to by pupils in classroom based research when asked to define an animal using drawings or specimens or when observing an authentic specimen, alive or dead (Bell 1981; Trowbridge and Mintzes 1985; 1988. Mintzes et al. 1991). Children do *not* notice the criterial attributes of animals that zoologists use in taxonomy unless they, and the rationale for their use and the system in which they are a component, are pointed out to them. This teaching function is, I believe, one of the major roles of animals as exhibits, which do belong to the genre of exhibits and fit within existing exhibit theory.

Observation is an equally important investigative method as designing investigations and, although it does not require intervention, it does require method. 'Unstructured observation of the living world, in the hope that the inductive method will yield a pattern, is a meaningless activity', (Hill 1987). Therefore, structured observations and discussion about them are just as much 'talking science' as the experimental method approach to science teaching that uses the language of predictions, results and conclusions. Biology is an observational science (Hill 1985) but this research shows that school groups seldom observe and focus on the criterial attributes used by zoologists in allocating specimens to their appropriate taxonomic position, the study of which is the core of biodiversity. Nor do they compare animals within superordinate classes establishing for themselves the criterial features, e.g. reptiles and the subordinate classes of snakes, lizards, tortoises and turtles, crocodiles, alligators. In the very few instances in the data where a consideration of subordinate and superordinate classes does occur the children focus on a linear vertical relationship, e.g. 'That's a lizard; it's a reptile *because* it has a dry scaly skin', and the children are operating a very narrow classical categorisation system of all or nothing, i.e. 'It has a dry scaly skin, *therefore* it must be a reptile.' Children either use a very restricted (school classification) naming system or allocate a specimen to a category with *one* defining feature and categorise animals according to 'nearest fit' to what they already know.

A study of the transcripts indicates that learning experiences which probe the understanding of the pupils by requiring them to reconcile any conflict between prediction and observation (White and Gunstone, 1992:44) are not created. There are very few instances when:

- a child justified his comment in the manner that Michael did in segment 32 when he said that the panda should not be there 'because it's panting...', implying that the conditions were not suitable, or were asked to do so.
- an adult tried to encourage the child to state what the animal reminded them of (Prologue segment 35);
- asked the child to enumerate what the features are that caused the child to allocate the specimens to the category that they named, as the Aunt strove to do so in segment 37 in which Michael identified a shark.

Moreover, teachers, and the chaperones present on school visits, were not relating exhibits and the form and functions of animals to each other. Nor were children learning one of the fundamental concepts of life, the energy chain - meat eaters eat plant eaters which eat plants and obtain the energy captured by them from the sun through the process of photosynthesis. The lack of teaching and talking science presents a challenge to zoos and museum.

Education is an aim of zoos and museums. They provides education either as part of the formal curriculum for school pupils (and, incidentally, their accompanying adults) or, informally, for leisure visitors. Teachers and chaperones may assist children learning at exhibits during field trips and education officers in zoos and museums may either assist these adults with interpreting the exhibits or in providing background knowledge of. Moreover, the zoo and museum educators may have an input into the design of exhibits and the interpretative labels and associated materials. However, the majority of the information provided is of a factual nature. The educators do not help the school groups in identifying the likely topics that the children will notice and showing how the observations made by the children could be developed into a learning process.

10.3.2b Superiority of museum animals as a resource for teaching and learning biodiversity

The primary educational function of natural history museums is seen as ‘stimulating interest in the natural world’ (Stansfield, 1994a:2) and, although collections are traditionally thought of as ‘a poor substitute for living organisms in their natural habitat’, they do ‘provide opportunities for close examination in a way that is seldom possible in the wild’ (Stansfield 1994b: 235). The data presented in this research suggest a natural history collection has the potential to be of prime importance in teaching children taxonomic zoology, relationships and adaptations of structures, behaviours and adaptations to habitat. Whether the children are in school or family groups, accompanied by at least one adult or not, the preserved collection could contribute effectively to the understanding of zoological science and conservation biology. Natural history collections should be regarded as the *essential* primary source of zoological education for both future scientists and for the public understanding of this particular science, leading into the areas of biodiversity and conservation. Museums have the distinct advantage that their specimens are both clearly visible and predictable, hence teaching points can be planned with certainty. Moreover, whilst both institutions provide a 'frame' through which specimens are viewed, that of the natural history collection is more defined, helping the visitors to allocate and observe the animals more easily. The following exchange occurred just inside the Mammal Hall in the Natural History Museums:

> Boy: That's a manatee. They came from Florida.
> Dad: Oh!
> Boy: They are nearly extinct. I know they come from Florida, they are protected in Florida.

Not only does this exchange provide an indication of an awareness about conservation issues it also contains an example of a knowledge source comment, e.g. 'I know....'

A natural history collection, unlike that of most zoos, provides examples of the range of biodiversity so students can learn an overview, not, as in many zoos, focus mainly on birds and mammals, as do a number of zoos, or one group, such as butterfly houses or hawk sanctuaries. Whilst this study did not focus on botanical specimens, it is likely that the pattern of observations would be similar. The value of natural history collections, in terms of education about biodiversity and criterial attributes of groups, is high, and superior to that of zoos, but the potential of both collections has not been fully exploited. If the main aim of the zoo, embedded in the mission statement, is education and conservation (Zoological Society 1994: ii and IUDZG & IUCN/ACC 1993), then such results give cause for concern.

10.3.2c Meeting curriculum requirements

Attention needs to be given by curriculum planners and the museum and zoos in the way that children are introduced to the taxonomy of living things. The level descriptions of the Science National Curriculum for England and Wales (DFE 1995:52) state that at Level 1: 'Pupils observe and describe a range of animals and plants in terms of features such as colour of coat, or size of leaf. They recognise and identify a range of common animals, using terms such as fly, goldfish or robin.' At Level 2 'They sort living things into groups, using simple features. They describe the basis for their groupings in terms such as numbers of legs or shape of leaf. they recognise that living things are found in different places such as ponds or wood.' Pupils at Level 4 (older junior children) should, 'use keys based on observable external features to help them to identify and group living things systematically. They recognise that feeding relationships exit between plants and animals in a habitat, and describe these relationships, using food chains and terms such as predator and prey.' At Level 5 pupils are expected to, 'recognise that there is a great variety of living things and understand the importance of classification'. Moreover, the National Curriculum requires that the learners will plan their work, make systematic observations and evaluate their observations.

The data collected in this thesis suggest that schools have a great deal of work to do before pupils will be meeting these levels of attainment yet the zoo and museum are ideal places to learn about the similarities and differences and to consolidate knowledge. Schools, and the zoos and museum, need to plan a progressive programme of tasks beginning with the salient features noticed by young children leading them into observing and constructing groups to which animals are allocated, using these features and identifying the ones important to zoological categorisation. Teachers need to establish at what level of hierarchical taxonomy they are going to start teaching their pupils names and how they will develop the ability of children to identify unknown animals and construct phylogenetic trees for animals. Teachers also need to identify what behaviours can be appropriately learnt at the animal specimens and how these can be related to adaptations of the animals to their environment and, finally, how the pupils can effectively be taught meaningfully about conservation of wildlife.

The lack of scientific method and terminology found in the observations made at the animal specimens suggest that the visits to farms could be focused on learning to observe animals so that when a zoo or museum is visited the children have had experience in looking at animals and will notice the attributes that are special to the exotic animals on display and begin to acquire a knowledge of zoology that matches their appropriate stage of development. Even though hierarchical taxonomies may not be within the abilities of Key Stage 1 and early Key Stage 2 children, they can learn names and features of animals and simple categorisations with a single entry criterion e.g. a snake is a reptile because it has a dry scaly skin. Frequently children are taught in terms of collections, artificial categories, e.g. minibeasts, pet animals, farm animal, poisonous animals, which, whilst matching children's inclinations to group in collections rather than taxonomies, has to be questioned as a teaching strategy because of the difficulty that might ensue when the concept is challenged by a teacher at a later date.

Teachers are inhibited from teaching their pupils because the majority lack the knowledge and understanding of zoology that are a prerequisite for directing the learning of others (Schulman 1986). The result is that conversations of school groups are commentaries with a few factual questions and statements, relatively little different from the conversations of family groups. The education departments of zoos, museums, and farms could play a part in providing opportunities for teachers to extend their own knowledge and explore effective methods of teaching at animal specimens in partnership with initial teacher trainers of primary science.

10.4 THE VOICE OF THE VISITORS

Listening to children and finding out what they understand about a particular topic is now a key aspect of science education (Gilbert, Osborne and Fensham 1982; Driver 1983). Knowledge of the learner is essential. The challenge to museums and zoos, and especially the education and interpretation departments, is to listen to their visitors and subsequently structure the interpretation which they provide for their visitors in such a way that a story is told which the visitors can 'read' and in which they can participate. The data suggest that the dinosaur exhibit does tell a story that is 'read'. However, the message about the exhibit is largely implicit within the zoo and completely so in farm, although zoos have explicit messages about conservation, the scientific name of the animal, its diet and country of origin. Visitors compose their own narrative using their knowledge and understanding experience and everyday vocabulary. However, in the museum some of the message is received by the visitors and the position of the animal, the design and location of the exhibit furniture and the information inherent in accessory interpretation devices, e.g. casts of footprints, electronic moving messages, help to deliver it. At the animatronics the visitors retold the story for themselves and referred to both the actions of the animal models, and the body parts which made them, as well as other aspects of the exhibit which helped tell the story.

It is interesting that the number of conversations which contained at least one comment about the environment, albeit low, were *similar for family groups and* *school groups* across the three types of exhibit (Figure 9.1). The highest number of conversations with at least one comment in this area was obtained for school groups at preserved animals. This result must be of concern to zoos who are overtly promoting environmental messages, the low key emphasis on delivery of the topic within the museums apparently has a greater effect and the family visitors also construct their own dialogue about such issues. The overt declarative conversation message of the zoo and the human-domination perspective through which people seek to control and affect wild animals (Kelsey 1991) alienates visitors or impedes their discussion on the topic. Management must not assume that the visitors, school or family, share their view of what is important regarding animals as exhibits. Such an awareness is especially important in the zoos where the interests of the visitors whose conversations were studied for this thesis appear to be very different from those of the management.

It is not only the 'story of the exhibit' that is important and that should match the interest of the visitors, but it is the level at which the concepts within the story are presented (Black and Harlen 1993). At the time when the data was being collected (1992 onwards), London Zoo began marketing itself as a place to visit in order to see 'conservation in action'. These data, presented in Appendix 2 band throughout Chapters 4 to 9, should act as a reality check for management who may at least discuss some of the issues raised. and the indicators of that which *does* interest the visitor, it is not conservation.

If museums and zoos were to pay more attention to how their visitors interact with the exhibit text, or the objects or animal specimens, they could assist in developing the public' understanding of the science of zoology and conservation biology. It is salutary to bear in mind the message conveyed in an article in Nature (March 1995)

> '..there is an awkward trap for those who mount public understanding campaigns: the temptation is to suppose that those asking for deeper understanding look for instruction of the kind offered to students - in this case to students ill-provided with elementary knowledge. Too many well-meant efforts at public understanding are, as a consequence, both patronizing and unenlightening.'

The data reported in this thesis suggest that the 'other world of learning, that of the visitors', identified by Hein (1995), is the world that is functioning within the museum and zoos at the traditional exhibits. Zoos were established to let visitors view curios and learn about animal diversity, but have changed the emphasis of their mission to that of conservation of endangered species. The Natural History Museum was established to educate people and had similar aims as zoos. As the Natural History Museum has evolved the emphasis has changed from biodiversity to one which relates the structures of the animal to the functions and behaviour and biological niche. The number of different exhibit galleries within the museum, and to which visitors went, make an overview of the success of the museum message difficult, because the museum now presents a variety of exhibits. The traditional specimens on the Mammal Balcony, no longer there, illustrated the variety of mammal life. Discovering Mammals uses 'a combination of traditional display techniques and interactive electronic exhibits to explore that relationship between a mammal and the environment - with the emphasis on conservation'[1]. Creepy-Crawlies was designed 'to draw visitor curiosity, enthusiasm, and excitement and to generate and promote a more positive and enlightened attitude toward a group that is generally stereotyped as bad.'[2].. A consideration of the data at the static specimens suggest that *some* of the messages of these exhibits reaches *some* of the visitors *some* of the time.

The aim of the new dinosaur exhibits was 'to put the flesh on the bones and let people see what dinosaur would have been like if they were alive' (Clark 1994). The data suggest that the dinosaur exhibit achieved its goal and the message reached the visitors. These exhibits, which are new in terms of the experience of most visitors, succeed in involving the visitors with the story being told and the message reaches the audience. Although, as dsicussed in Chapter 4, the plethora of skeletons of dinosaurs with the rest of the gallery apparently confuses young children who take away the message that bones equals dinosaurs, not that dinosaurs are boned animals and all that is left is the bones.

10.5 THE WAY FORWARD

Although museums and zoo professionals have moved on from the original intentions of their founders to educate the public about the diversity of animal life, the majority of the public, from assessing the content of the comments analysed for this thesis, have not. Lord Rothschild, ''found the Animal Kingdom most exciting happening of the day and wanted to share it with every Tom, Dick and Harry'. And they liked what he was doing' (Rothschild 1983: 102). Surely the fundamental educational role of the zoos and museum is to share this even today?

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[1] Press Release Natural History Museum 30.10.86

[2] Internal memo for press office Natural History Museum 17.03.89

The culture of the institution and that of the visitor are at odds and there is a failure to communicate between them. If museums and zoos were to identify the factors involved in exhibit viewing - the elements of personal, social and physical contexts, they might obtain a more realistic view of the interaction of their visitors with the exhibit, a consumer viewpoint rather than that of the producer, from which more effective interaction with exhibits for visitors, be they schools or families, could be designed.

It is interesting to reflect how different the experience of the visit to zoo could have been had the Zoological Society not sold its museum to the British Museum. If visitors could look at live animals and refer to a static specimen of the same species nearby they would notice and comment far more about the animal and its attributes than they do at the single type of exhibit. However, the most effective manner in displaying animals and drawing visitors to notice particular attributes is the design and display of animated models. Failing this, live and static animal exhibits of the same species adjacent to each other might encourage visitors to notice more than the salient everyday features. Furthermore, the way in which visitors look at the animals as exhibits may not be peculiar to animal exhibits but may reflect the way in which the visitors who are non-specialist view any exhibit.

Whatever the means that is most effectively employed to achieve it, the aim of museums and zoos should be similar to that expressed as Lord Rothschild's aim for visitors to his zoological museum at Tring (now part of the Natural History Museum), 'but he considered it (i.e. the great wealth and variety of the animal kingdom) must be displayed in a relatively small space, so *that the visitor left feeling excited and stimulated, not mentally and physically exhausted*'.'(Rothschild 1983: 102) [my italics].

Primary school teachers and the accompanying adults are essentially the public in their understanding of biology for they are not often trained as biologists to any greater extent than are the general public. The adults with school groups have the predisposition, along with other museum visitors, that museums are for learning and school and family groups generate more conversations with higher factual content and knowledge source comments in museums than in zoos.

Ten important issues have emerged from considering the data of this study, obtained from analysing the conversations of visitors to animal exhibits:

1. Visitors talked about exhibits when in front of them, and, in almost every instance, about the animals within the exhibits, but the exchanges were concerned with searching for the specimens and naming them and making observations. Animals as exhibits engendered comments about their salient features, size, shape colour and action and those behaviours that were occurring at the time of observation, but are such features those that would be observed at *any exhibit*, irrespective of the type of object being displayed?

2. A similar pattern of content was found within conversations at animal exhibits. The most frequent topic category was interpretative comments, followed by management and social comments, other aspects of the exhibit, attitudes and animal focused comments, names, body parts and behaviour, but environmental comments, including those about conservation issues, were little heard.

3. Although the pattern of content was influenced by three main factors: the site, the type of specimens, the rationale for the visit, overall visitors commented in similar proportions whether they were school or family irrespective of the nature of the specimen.

4. The museum visits overall engendered more content and knowledge source comments in both groups, schools and families and, surprisingly, more affective comments than did the zoo.

5. Although the type of exhibits within the museum, preserved specimens or animated models, influenced the content of the conversations in some categories, most conversations that referred to body parts, most emotive comments and the least referring to names, were generated at the dinosaur models, the similarity in the

content of conversations of all groups at the different types of specimens is noteworthy.

6. The wide variety of species exhibited to be observed in the museum and zoo elicited higher numbers of comments which referred to naming. It is not surprisingly that such comments were not heard within the conversations at either the dinosaurs or the farm animals because there were few species displayed.

7. The rationale for the visit affected the content and form of the conversations surprisingly little. School groups to the zoo and animated models generated significantly more knowledge source comments, and groups at the live and preserved animals more emotive comments than families. All school groups commented more about body parts than families. A few striking differences were noticed. Family zoo groups commented significantly more about exhibit access than any other group and those family groups at preserved animals significantly less about other aspects of exhibits.

8. Within school groups the nature of the groups affected the content and form of the conversations: pupils-only groups made least comment whilst teacher-groups generated overall most knowledge source comments as well as environmental comments at the preserved animals; chaperone-groups generated the most management social comments and categorised and compared the animals more but their conversational content resembled more that of teacher-groups than of family groups visiting the same sites.

9. There was an overall similarity in conversational content between both age groups. The surprisingly few differences suggest that progression in observations was not occurring and that teachers (and chaperones) were not focusing the attention of their pupils on different topics in a planned development of concept acquisition.

10. The carefully planned, designed and exhibited animated dinosaurs were the exhibits whose message was received and discussed by the visitors; the message of the traditional preserved models was partially received but at living exhibits it was obscure and missed the visitors.

Hitherto an overview of the main categories of conversations generated by children of primary age and their accompanying adults when looking at animals, which considers the influences of the site, design of the exhibits and type of specimen together with social factors, such as the rationale for the visits the influence of different kinds of adults, and the effect of the age of the children, has been missing from the literature. This thesis has provided a picture of what is occurring and provides a basis for further detailed studies on particular aspects of this work. The discussion of the various categories of conversation and the effect on this of a number of identified factors across animals as exhibits could provide a basis for museums and zoos to construct exhibits and provide interpretation and educational programmes which are both meaningful to and used by visitors.

The challenge to zoos and museums is to close the abyss between what they want to *tell* the visitors and the *interests* of their visitors and to which they will attend. Such an objective would encompass both family groups and school groups. The approach might assist the children visiting under the auspices of school groups to develop their understanding and knowledge of animals, and effectively study zoological science, rather than merely observe and comment on animals. Zoos and museums are in the business of the public understanding of science and the science is biological. Viewing live animals is only partially enlightening for the visitors - the children and their accompanying adults, and the data show that explicit messages scarcely reach the visitors. Viewing traditional static, preserved specimens is more enlightening than viewing live zoo animals and the message inherent in the exhibits of animated dinosaur models reaches its target. If museums and zoos want to get a message to visitors the answer is to have animatronics which highlight the behaviour and associated body parts that are involved. Although not wholly feasible, this proposal provides food for thought. The public, be they school groups or family leisure visitors, 'needs encouragement, not instruction', (Nature 1995), when they make their visit.

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Teaching Evolution in School Science Classes

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ERIC Clearinghouse for Science, Mathematics, and Environmental Education DIGEST

Nothing in Biology Makes Sense Except in the Light of Evolution. T. Dobzhansky

What seemed like a provocative statement twenty years ago has become firmly established as a unifying idea in biology education. Speaking at a convention of the National Association of Biology Teachers, Dobzhansky (1973)pointed out the remarkable diversity of life and the striking unity of life, both made more intelligible by the theory of evolution. He went on to say:

> *Seen in the light of evolution, biology is, perhaps, intellectually the most satisfying and inspiring science. Without that light it becomes a pile of sundry facts—some of them interesting or curious but making no meaningful picture as a whole.*

Evolution was also identified as the unifying theme of biology by the American Society of Zoologists (Moore, 1984); the Society's project to improve teaching at the college level first focused on evolutionary biology.

More recently, the National Research Council (NRC) (1996) identified evolution as a major unifying idea in science that transcends disciplinary boundaries; a powerful idea to be used across all grade levels to guide instruction and align the curriculum. Biological evolution was also listed as one of the six content areas in the life sciences that are important for all high school students to study. Following are the concepts and principles associated with this content standard (p. 185):

- Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.
- The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.
- Natural selection and its evolutionary consequence provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.
- The millions of different species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors.
- Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships. Species is the most fundamental unit of classification.

The American Association for the Advancement of Science (AAAS) (1993) also identified the evolution of life as one of six major areas of study in the life sciences. In addition to the guidelines provided by the NRC standards (1996), the AAAS emphasized genetics and molecular biology, and has suggested that students also know that:

- Molecular evidence substantiates the anatomical evidence for evolution.
- Heritable characteristics can be observed at molecular and whole-organism levels—in structure, chemistry, or behavior.
- New heritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells.
- Life on earth is thought to have begun as simple, one-celled organisms about 4 billion years ago. (p.125, abbreviated)

Barriers to Meeting the Standards

A review of the literature on teaching and learning evolution (Demastes, Trowbridge, & Cummins, 1992) revealed several barriers, including certain intuitive ideas held by students, teleological and anthropomorphic thinking, and the influence of strongly held beliefs. These and other barriers have been discussed more fully at an evolution education research conference (Good and others, 1992), and in a special issue of the *Journal of Research in Science Teaching* (Volume 31, Issue 5, May 1994).

Whether one surveys school students, college students, teachers, or school administrators, findings reveal many misunderstandings regarding evolution, and substantial acceptance of pseudoscientific ideas (Brumby, 1984; Demastes, Settlage, & Good, 1995; Greene, 1990; Lord & Marino, 1993). In developing a teaching module on evolution, Bishop and Anderson (1986) identified several critical barriers that hinder student understanding, including:

1. Failure to make a distinction between the separate processes responsible for (a) the appearance of traits in a population and (b) the survival of such traits in the population over time.
2. Failure to recognize that natural selection is dependent on differences (in genetic traits and in breeding success) among individuals of a population.
3. Misinterpreting the nature of evolutionary change in populations, believing that all individuals change slowly over time. (pp. I-3)

Instructional Strategies

Scharmann (1993) has provided some general guidelines for designing lessons based on a conceptual change approach to instruction. It seems particularly crucial that teachers find ways to enrich the teaching of evolution given both the conceptual difficulty students have and the limited attention given to evolution in textbooks (Rosenthal, 1985; Glenn, 1990; Skoog, 1979).

Hilbish and Goodwin (1994) have pointed out that the standard approaches to teaching natural selection through artificial examples and computer simulations show what could happen, not what is happening. They propose the use of real examples of natural selection in action, and they have described activities using the familiar dandelion. McComas (1991) also emphasized the importance of direct inquiry and has provided an annotated list of activities from non-textbook sources.

For teaching about human evolution, Offner (1994a, 1994b) has described activities using maps of human chromosomes to illustrate mechanisms of evolutionary change. Gipps (1991) described using casts of anthropoid skulls, and Riss (1993) suggested a related activity using photocopies of skulls.

The "Creationist" Resistance

Perhaps most unsettling is the finding that a substantial proportion of high school biology teachers hold pseudoscientific beliefs, with nearly 40% thinking "there are sufficient problems with the theory of evolution to cast doubts on its validity" (Eve & Dunn, 1990). Those holding such views seem particularly vulnerable to the influence of various groups wishing to reduce attention to evolution in science classes. The teaching of evolution has been a source of controversy in American schools throughout the century (Larson, 1985; Nelkin, 1982), and advocates of evolution have continued to offer rebuttals to creationist claims (Berra, 1990; Ruse, 1982). In the early 1980s, the controversy led to a conference to clarify issues (Zetterberg, 1983). Though many scientific, religious, and educational organiza-

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tions explicitly support the teaching of evolution (McCollister, 1989), many individuals also endorse the importance of upholding the integrity of science while also acknowledging the validity of deeply held religious beliefs (Hanson, 1986). Educators wanting more information supportive of evolution education from a Christian perspective may be interested in a resource packet, "Creationism, the church, and the public schools," available from the United Church of Christ Resources, Inc. (call 1-800-537-3394), or a booklet by the American Scientific Affiliation (ASA) entitled, "Teaching science in a climate of controversy." The ASA is an organization of Christians with academic degrees in science that takes no official position, but supports the teaching of evolution as science. Contact the ASA at P.O. Box 668, Ipswich, MA 01938-0668 (Call (508) 356-5656; E-mail: asa@newl.com)

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Where to Go for Help

Information Centers

Educational Resources Information Center (ERIC). The ERIC database includes bibliographic information for approximately 800 items on the teaching and learning of evolution, from journal articles about classroom activities to research findings about student conceptions. Search the database using descriptors such as: evolution, biology, science education, science activities, science instruction, science curriculum, scientific concepts, genetics, misconceptions, creationism, and controversial issues course content For more information, contact ERIC/CSMEE, (800) 276-0462 or (614) 292-6717; Fax: (614) 292-0263; E-mail: ericse@osu.edu.

National Center for Science Education (NCSE). The NCSE sponsors several activities to support the teaching of evolution. The organization publishes a quarterly newsletter for members, and a semi-annual journal, *Creation/* Evolution. NCSE also distributes many books and sponsors many seminars and workshops. For more information, contact NCSE, P.O. Box 9477, Berkeley, CA 94709. Telephone: (800) 290-6006 or (510) 526-1674; Fax: (510) 526-1675; E-mail: ncse@crl.com.

Internet Resources

Harvard's *Evolution Virtual Library*
http://golgi.harvard.edu/biopages/evolution.html

This World Wide Web server provides an extensive collection of Internet links to organizations, publications, academic programs, museums, collections, and exhibits. This is a good place to start a search for current information relating to evolution.

The Talk.Origins Archive
http://rumba.ics.uci.edu:8080/origins/faqs.html

This home page presents files from a UserNet group, talk.origins. Though strongly oriented toward issues relating to evolution and creation, this site presents some very readable essays on evolutionary theory, findings, and methods.

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The Educational Resources Information Center is a nationwide information system initiated in 1966 by the U.S. Department of Education. ERIC has developed the largest and most frequently used education-related database in the world. For information, call 1-800-538-3742.

Table 1.1

Reasons for a visit and patterns of behaviour, including those of family and school groups

	Typologies of Visitors. Four main categories according to the purpose of the visit		Typologies extrapolated to the school and family visit	
Visitor's criteria	1. Wolf and Tymitz (1979) typology reflects visitor's reason for attending and likens it to a traveller	2. Falk (1982) Visitor likened to a shopper	1. Family visit behaviour shown by members Michael's family (The Prologue transcript)	2. School visits
Specific reason for visit associated with a specific exhibit	'Very interested visitor', like a dedicated traveller, knows exactly where they are going	Serious buyer, know exactly what they want	e.g. segment 18 Michael asks,' Have they got some snakes?'.May show specialised knowledge at exhibit e.g. Michael's knowledge about cobras and vipers in segments 29 and 27	Educational rationale of visits may have identified specific exhibits for observation and teacher may focus on specific aspect of animal
Generally interested, visitor selects from what is on offer	'Cafeteria' traveller selects from an exhibit map or route and stops off	'Impulse buyer'	Visitor sees something which catches his attention, e.g. Prologue segment 22, Michael called out, 'Oh look at these'	Free time in museum where children can look at what they would like e.g. dinosaurs at museums, Chimps at the zoo
Casual speculative visitor with a general interest	'Nomad' wanders around	'Window shopper' who browses at each window in which they are interested, may enter and purchase	Visitors walk round and look because 'they are there' e.g. Prologue segment 7, Michael asks his brother, 'Hey Neil, What's over there?'	Free time wanderers, no particular ideas of what they would like to look at.
The incidental visitor, who is passing through the museum or zoo	'Commuter' type of visitor on the way to something else, e.g. a meeting in the institution, or using the zoo as a short cut, lunch site	'Marketing target' non-shopper who suddenly sees something in shop window, stops, looks, even buys	In segment 70 of the Prologue Michael and his aunt saw the seals on his way to eat but stopped and looked even though desperately hungry	Notice exhibits en route for a target e.g. getting to lecture hall or particular animal show, lunch room, shop, or lavatories

Table A3.5

Conversations of school groups at live animal exhibits, USA and England

Category	London n=459		Whipsnade n=197		Total England n=656		Cincinnati n=239		Indianapolis n=62		Total USA n=301		χ^2 1 df	Probab - ility	Phi ^{2}
	no	%	no	%	no	%	no	%	no	%	no	%			
Mngt./ Social	354	77	150	76	504	77	175	73	48	78	223	74	0.85		
Exhibit access	289	63	137	70	426	65	144	60	40	65	184	61	1.30		
Other exhibit	227	50	107	54	334	51	97	41	30	32	127	42	6.29	p<0.025	0.01
Interpretative	443	97	194	99	652	99	235	98	62	100	297	99	N/A		
knowledge source	254	55	128	65	382	58	93	39	34	55	127	42	21.32	p<0.005	0.02
Affective attitudes	193	42	60	31	253	39	88	37	21	32	109	36	0.49		
emotive	143	32	28	14	171	26	87	36	21	32	108	36	9.62	p<0.005	0.01
Body parts	280	61	117	59	397	61	118	49	33	53	151	50	9.04	p<0.005	0.01
Behaviour	301	66	122	62	423	65	135	57	51	93	186	62	0.64		
Naming	401	87	165	84	566	86	209	57	44	71	253	84	0.83		
Environment	19	4	15	8	34	5	26	11	1	1	27	9	4.95		
conservation	5	1	3	1	8	1	14	6	1	2	15	5	N/A		
habitat	14	3	12	6	26	4	13	5	0	0	13	4	0.07		

Appendix 1

DEMOGRAPHIC DATA

1 LIST OF SCHOOLS

The number of classes from whom conversations were collected at London Zoo, Whipsnade Wild Animal Park, and at the Natural History Museum, London, are shown in Table A1. The distribution is shown separately for the three types of exhibits: live animals; preserved specimens; and animated dinosaur models. Within each category the classes are grouped according to their geographical location.

Table A1

The geographical locations of the schools grouped according to the location where the children viewed the animal exhibits

Geographical Area	Museum animals	Zoo animals		Animated models	Total of schools. The total number of classes is higher than the number of schools
	Natural History Museum, London	London and	Whipsnade	Natural History Museum, London	
London	19	19	3	26	67
Home Counties	8	9	4	19	40
Midlands	4	1	0	1	6
East Anglia	1		0	1	2
West of England	1		0	1	2
South e.g. Sussex	0			3	3
Scotland	0		0	1	1
	33 schools	36 schools (29 London Zoo) (7 Whipsnade)		52 schools	121 schools

2. AGES OF GROUPS AND GEOGRAPHIC ALLOCATION OF SCHOOLS

Table A2 shows the distribution of the ages of the schools groups that visited the three different types of animal specimens.

Table A2

Ages and area of origin of the school groups at the three different types of animal exhibit.

Area of school's location	Museum animals	Zoo animals	Animated models	Total number of classes for each area
London	5 reception 1 (yr 1) 2 (yr.2) = 8 4 (yr 3), 2 (yr 4), 1 (yr 5), 1 (yr 6) = 8 Total 16	6 reception 3 (yr 1), 6 (yr 2) = 15 3 (yr 3), 1 (yr 4),1 (yr 5), 2 (yr 7) = 7 Total 22	4 reception 5 (yr 1), 10 (yr 2) = 19 6(yr 3), 2 (yr 4), 1 (yr 6)= 9 Total 28	66
Home Counties	1 reception,1 (yr 1), 4 (yr 2) = 6 2 (yr 4),1 (yr 5), 2 (yr 6), 1 (yr 7) = 6 Total 12	1 reception, 4 (yr 1), 2 (yr 2) = 7 1 (yr 4), 3 (yr 5), 2 (yr 6), 1 (yr 7) = 7 Total 14	1 reception, 3 (yr 1), 10 (yr 2) = 14 7 (yr 3), 3 (yr 4), 1 (yr 5), 2 (yr 6), 1 (yr 7) 14 = Total 28	54
Midlands	3 (yr 5), 1 (yr 7) = 4 Total 4	1 (yr 2 Total 1	1 (yr 2), 1 (yr 3), 1 (yr 5) Total 3	8
East Anglia	1 (yr 6) Total 1	0	1 reception, 1 (yr 1) = 2 1 (yr 3), 1 (yr 4) = 2 Total 4	5
West of England	1 (yr 6) Total 1	0	1 (yr 6) = 1 Total 1	2
South	0	1 reception Total 1	1 (yr 1), 2 (yr 2)= 3 1 (yr 7)=1 Total 4	5
Scotland	0	0	1 (yr 6) =1 Total 1	1
Totals	34	38	69	141

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3. THE NUMBER OF SCHOOL GROUPS ARRANGED ACCORDING TO THE SCHOOL YEAR OF THE PUPILS

Table A.3. shows the total of classes with whom the researcher worked. The classes are arranged according to the year group to which the children belonged.

Table A3

Total of classes at each site according to the year of school [n= 142]

	Museum animals		Live animals		Animated models		
Year group	By year group	Two age groups (7 and under and 8 yrs +)	By year group	Two age groups (7 and under and 8 yrs +)	By year group	Two age groups (7 and under and 8 yrs +)	overall totals
pre-school/ reception	6		8		6		
Year 1 (6 yrs.)	2	= 14	7	= 24	10	= 38	= 76
Year 2 (7 yrs.)	6		9		22		
Year 3 (8 yrs.)	4		3		15		
Year 4 (9 yrs.)	4		2		6		
Year 5 (10 yrs.)	5	= 20	4	= 14	2	= 31	= 65
Year 6 (11 yrs.)	5		2		6		
Year 7 (12 yrs.)	2		3		2		
Totals	34	34	38	38	69	69	141

4.DATE OF VISIT

Table A4

The name of the school, date of visits and age of the class, that visited museum animals in The Natural History Museum, London

Date of visit	Individual Age groups	Number of classes in each age group	
		Seven and under	Eight to twelve
5th February 1992	3 reception	3	
	1 (yr 3)		1
11th February 1992	1 (yr 2)	1	
	1 (yr 4), 1 (yr 5), 1 (yr 6)		3
13th February 1992	1 pre school, 2 (yr 2)	3	
	1 (yr 3), 1 (yr 4)		2
18th February 1992	1(yr 2)	1	
	1 (yr 5), 1 (yr 6)		2
2nd March 1992	0	0	
	1 (yr 5), 1 (yr 6)		2
10th March 1992	0	0	
	1 (yr 6)		1
11th March	2 Pre-school,1 (yr 2).	3	
	1 (yr 3), 1 (yr 5), 1 (yr 7).		3
3rd April 1992	0	0	
	1 (yr 6),1 (yr 7)		2
17th June 1992	1 (yr 2)	1	
	0		0
30th June 1992	1 (yr 1)	1	
	1 each (yr 3, 4 & 5)		3
9th July 1992	1 (yr 1)	1	
	1 (yr 4)		1
	34 classes	14 age group 1	20 age group 2

The age of the classes worked with at the Dinosaur models at Natural History Museum, are shown in Table A5.

Table A5

Schools that visited the Dinosaur Gallery (animated models)

Date of visit	Individual class groups	Number of classes in each age group	
		Seven and under	Eight to twelve
5th May 1992	1 (yr 1), 2 (yr 2)	3	
	1 (yr 3), 1 (yr 6), 1 (yr 7)		3
12th May 1992	1 pre-school,	1	
	1 (yr.3)		1
19th May 1992	2 (yr 1), 4 (yr 2),	6	
	2 (yr.3), 1 (yr 6)		3
21st May 1992	3 (yr 2)	3	
	4 (yr.3) 1 (yr 6)		5
2nd June 1992	2 pre-school, 3 (yr 2)	5	
	1 (yr 3), 1 (yr 5)		2
4th June 1992	1 (yr 1), 2 (yr 2)	3	
	1 (yr 7)		1
9th June 1992	4 (yr 2)	4	
	1 (yr 4), 1 (yr 5), 1 (yr 6)		3
16th June 1992	1 pre-school, 2 (yr 1), 2 (yr 2)	5	
	3 (yr 3), 1 (yr 4)		4
2nd July 1992	1 (yr 1), 1 (yr 2)	2	
	1 (yr 3), 2 (yr 4)		3
9th July 1992	1 pre-school, 2 (yr 1)	3	
	1 (yr 3) 1 (yr 4)		2
21st July 1992	0	0	
	1 (yr 3), 1 (yr 4)		2
22nd July 1992	1 pre-school, 1 (yr 1),1 (yr 2)	3	
	1 (yr 3), 1 (yr 6).		2
Totals	69 classes	38 Age group 1	31 Age group 2

The list of classes that visited the zoos is shown in Table .6. There was a total of 38.

Table A6

List of Schools and the age of the classes that visited the Zoos.

Name of Zoo and date of visit	Individual age groups	Two main age groups	
		Seven and under	Eight to twelve
London Zoo			
18th Nov. 1991	1 pre-school, 1 (yr 1)	2	
	1 (yr 7)		1
27th Nov. 1991	0	0	
	1 (yr 4)		1
28th January 1992	1 pre-school, 1 (yr 1)	2	
	0		0
6th May 1992	1 pre-school, 1 (yr 1)	2	
	1 (yr 5), 1 (yr 6).		2
13th May 1992	1 pre-school, 1 (yr 1)	2	
	1 (yr 3) 1 (yr 7)		2
20th May 1992	1 pre-school, 2 (yr 2)	3	
	1 (yr 3)		1
3rd June 1992	1 pre-school, 1 (yr 2)	2	
	1 (yr 6)		1
10th June 1992	1 (yr 1)	1	
	1 (yr 7)		1
15th June 1992	3 (yr 1), 1 (yr 2)	4	
	1 (yr 3), 1 (yr 4)		2
Whipsnade			
29 November 1991	0	0	
	2 (yr 5)		2
8th May 1992	1 (yr 1), 1 (yr 2)	2	
	1 (yr 5)		1
12th June 1992	1 pre-school, 1 (yr 1), 1 (yr 2)	3	
6th December 1991	1 preschool	1	
	0		0
	total 38 classes	24 age group 1	14 age group 2

Data were collected during pilot studies at Mudchute Farm from a primary school from Tower Hamlets (Year 6).

Data were also collected at Burchetts Green Farm (Berkshire College of Agriculture) from year 7 children, (pre-school), Junior School (2 classes of year 4) and a middle school, (2 classes of year 4). Of the seven classes, two contained pupils of seven years or under and the remaining five groups of had children of eight to twelve years.

APPENDIX 2

THE SITES OF DATA COLLECTION AND RESULTS

This appendix contains descriptions of the three main sites of data collection and summary sheets of the main categories of data that were collected at each site in this study. It has been presented here for reference and the information encapsulated within the tables is used in the discussion within the text of the thesis where the data is interpretted.

A2.1 THE SITES

A.2.1a An historical perspective

The missions and expectations expressed by London Zoo and the Natural History Museum, where much of the data were collected, have similarities, therefore I present the historical origins of the two institutions which are the main locations where data was collected for this research project.

Human beings have kept exotic animals for over two thousand years (Bostock 1987) although originally collections were a royal prerogative. The Royal Collection in England appears to have been started by Henry I at his palace of Woodstock (Zuckerman 1976), and rulers gave each other exotic beasts as presents, a practice which still occurs today (Keeling 1984). However, while the Schonbrunn Zoo, Vienna and Les Jardins des Plantes in Paris are descended from such royal collections, London Zoo at Regent's Park, opened in 1826, was the first zoo that was founded for general visitors to view such exotic specimens, albeit in the early days visitors had to be Fellows of the Zoological Society (Vevers 1976: 7). One of the three main tenets expressed in the mission statement of the Zoological Society of London is education, 'to increase the public knowledge and appreciation of animals' (Zoological Society 1991). As far back as 1885, the prospectus of the Society suggested that 'vulgar admiration' was not the objective of their animal collection (Jordan and Ormrod 1978). However, despite the educational and scientific aspirations of the Learned Society, the Zoological Gardens became very much the place for a leisure visit, - in the words of the popular Victorian song, 'walking at the zoo is the thing to do' (Keeling 1984) - and the attitude persists.

Formal educational opportunities have been provided at the London Zoo for many years. In the 1930s the London Day Training College (the precursor of the University of London Institute of Education) was bringing trainee school teachers to lectures, given by a lecturer from Imperial College, on how to use the collection. At the same time the first children's zoo in the world and an art studio were opened providing a different kind of educational opportunity for students and other members of the public. In 1958 a dedicated department for school visits was set up and an Education Officer appointed (Tunnicliffe 1992).

Museum collections, based on those assembled by private people, were also started so a wider audience for curios and animals could be reached. The Natural History Museum collection began with that of Sir Hans Sloane, which had been purchased for the nation by Parliament. Originally the Natural History Museum was a component of the British Museum which had been founded in 1753 by an Act of Parliament. In 1860 the idea of the present separate museum was accepted and the new buildings, on part of the site of the International Exhibition of 1862 (hence an entrance is in Exhibition Road) were ready in 1880. Parts of the museum opened to the public in 1881 but the zoology galleries opened in 1884. These incorporated much of the content of the museum of the Zoological Society, which was disbanded in 1855, and given to the British Museum in Bloomsbury (Stearn 1981: 25) although some items were sold privately and a Dr Crisp bought the preserved body of the giraffe that had belonged to George IV[1]. It is interesting to reflect that had the zoo retained its museum and exhibited live and preserved specimens in the same location there would not have been a need for the Natural History Museum.

The objectives of the Natural History Museum also embrace the provision of information for the public as well as for the learned. Indeed, the educational and social mission of the museum was in taking knowledge to the working people. Henry Cole (quoted by Pearce 1992: 4) wrote in 1857, quoting the Act of Parliament that had set up the British Museum in 1753, 'the said museum or collection shall be preserved and maintained not only for the inspection of the learned and the curious, but for the general use and benefit of the public.' Furthermore, the museum was envisaged as a vehicle which would play a role 'in the development of the reliable orderly citizen', an important mission embraced by middle class Victorians.

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[1] personal communication from Clinton Keeling,Esq., historian of zoological gardens, 1994

However, not until 1912 was John Leonard appointed as guide demonstrator in the Natural History Collection, following correspondence about helping visitors realise the wealth of information (Stearn 1981: 101). After the Second World War, a young school teacher, Miss J. G. C. Palmer, persuaded the museum trustees to establish a children's centre and in 1948 she was employed part time to help child visitors to understand and show interest in the exhibits. The London County Council appointed another teacher, Miss MacIver, to help in 1949 (Stearn 1981: 154-155). Official recognition that school parties could be catered for came in 1970 when an education officer was appointed to run a free educational service to schools and other students.

When the zoo education department was set up at London Zoo, in 1958, secondary aged children were originally those who benefited (Tunnicliffe 1992a), either studying for A level zoology or O level biology (the equivalent of this examination is now the GCSE) or studying introductory biology in the first year of secondary education, being taken to the zoo to observe the variety of animal life. However, as educational patterns changed so too did the profile of the school visitors to zoos and museums in the United Kingdom. The greatest proportion of school visitors to zoos and museums are now primary school children or middle school children. In 1991 members of primary schools accounted for 70 per cent of the school parties which visited the Education Department at London Zoo (Zoological Society of London 1991: 24). However, the original museum ethos, one of providing learning opportunities, has remained, but despite the original mission statement of the Zoological Society of London, many zoos, including London, have become associated in the public's mind with the enjoyable day out:

A2.1b The settings

The settings of the two main authentic animal collections are different in nature. The Natural History Museum is an impressive building constructed in the second half of the nineteenth century, designed by Waterhouse, and opened in April 1881. It has some intriguing features such as top lighting whilst the architectural style is German Romanesque but the symmetry of the plans and building were Waterhouse's compromise between the gothic and the classical style (Girouard 1981). The effect is an imposing edifice, probably unlike anything the primary schools children visiting for the first time have ever encountered before. School parties are admitted free of charge but a payment is charged for any worksheets provided by the museum.

In London Zoo there is a mixture of the traditional and the new. New buildings, such as the Snowdon Aviary, exist side by side with renowned architectural ones, for example the Penguin Pool and the Clock Tower, (the Old Camel House) (Guillery 1993). None of these buildings is necessarily the type of construction that modern school children (and the public in general) would consider appropriate for the keeping of animals. The Penguin Pool is an example of the Tecton style of architecture and the first enclosure, the rooks cage, and the camel house from the original zoo can still be seen. The early buildings of the zoo reflect the history of the area set in a park like atmosphere. Whipsnade on the other hand is an experience of openness, vast paddocks with few buildings, and a site where the visitor frequently has to walk a long way to see one type of animal. Even once the visitor has reached area where the animal lives they have to 'work' hard to find the animals, and are frequently unable to do so. However, most of the schools concentrated their visit on the Discovery Centre at Whipsnade. This centre is under cover and has a high density of animal exhibits within a short distance. Its design is very similar, from the point of view of children looking at animals, to the Reptile House or the Clore Pavilion at London Zoo.

The conversations of children and their accompanying adults visiting the Dinosaur Gallery in the Natural History Museum, London on school organised outings were collected in May, June and July 1992. The Dinosaur Gallery opened in April of that year and the younger children, year 2 (7 - 8 year olds) were involved in government tests known as SATS during this time. A number of teachers brought their children to the museum, and to see the dinosaurs in particular, as an outing after the standard attainment tests that were introduced in 1992.

The topic 'Dinosaurs' was a popular one, particularly with Key Stage 1 children, and a visit to the Natural History Museum, as a planned school outing to look at the dinosaurs, provides the educational objectives (Marshdoyle 1983) for such an outing. The topic of dinosaurs was studied in the state schools as part of the National Curriculum

(Department of Education and Science 1991).

The programme of Study for Attainment Target 2, Key Stage 1 states:-

> '[Children] should have opportunities, where possible through first hand observation, to find out about a variety of plant and animal life and become aware that some life-forms became extinct a long time ago and other more recently'.

Whilst at Key Stage 2 the programme of study stated:

> 'They should be introduced to how plants and animals can be preserved a fossils'.

There are two separate animated dinosaur exhibits in the Natural History Museum. One is a diorama which is a reconstruction of the of the scenery as it is believed to have been at the time the animals portrayed were alive. It contains four animated dinosaurs, one of these, *Terontosaurus*, is lying on the ground. It is being attacked by three smaller animals called *Deinonychus* . The animal models make movements in a regularly repeated sequence and there is a regular, loud, noise 'off' as part of the animation cycle. This exhibit is a bi-sensory experience in terms of the triangle of sensory perceptions

(Dale 1954; Peart 1984; Peart and Kool 1988; Yellis 1990) and the visitors are passive participants, or voyeurs, in a flash-back scene which they perceive through sight and sound, but there is no opportunity for them to interact with the exhibit in any other way than 'talking' to it.

The scene is set in time period (Yellis 1990) other than the present. Visitors respond to dioramas in a more positive way than to single specimen exhibits and exhibits with no visual barriers have a positive effect on visitors' perceptions (Peart 1984; Peart and Kool, 1988). The design of the dinosaur diorama enables the visitor to look down over a railing and is not an ‘immersion ‘experience (Coe 1986). The visitor approaches the first diorama from a high level walkway, the mezzanine floor, enters the gallery at the back of the exhibit where there is a viewing window. They proceed down a slope in semi-darkness, around a right angled bend, and then they are able to view the diorama. The visitor is separated from the exhibit by a barrier upon which, at intervals, there are several identical labels with the names of the animals and a brief explanatory text. The visitors continue down a sloping ramp, turn another corner, walk past the end side of the exhibit, and out into the main Dinosaur gallery at ground floor level.

The other animated dinosaur is small model placed in a type of transparent tank located at the exit of the main gallery. There is no interpretation accompanying this exhibit and the model is programmed to make a sequence of movements in a regular cycle, stretching its back leg, moving its tail, opening its eye and breathing.

The data from each site were coded according to the categories of the terminals of thesystemic network (Chapter 3). Each table is arranged in the form of the network with the most general categories at the right hand side of the page and the terminals at the left hand side with subsuming categories being positioned in the appropriate location between the finest terminals and the most general. The results from the study are shown as a percentage of the total number of exhibit-focused conversations and as a percentage of the total number of conversations within the parent category, hence 'head' is shown as a percentage of all the exhibit-focused comments and 'body parts' whilst the total of 'body parts' comments is shown as a percentage of the total of exhibit-focused conversations and of animal-focused conversations, 'body parts'.

The overall results of the analysis of the transcripts is given in the following tables.

Table A2.a

Table number	Category of Data
Table 1.	Prologue 'Michael' data.
Table 2.	Live Animals at London Zoo Schools.
Table 3.	Preserved Animals at the Natural History Museum London, Schools
Table 4.	Animated models of Dinosaurs at the Natural History Museum London, Schools.

Table A2b

Family Data from zoos (England and USA)

Table Number	Category of data
Table 5	Family data from London Zoo.

Table 6	Family data from Rio Grande Zoo.
Table 7	Family data from St Louis Zoo
Table 8	Family data from Caldwell Zoo, Tyler, Texas.
Table 9	Family data from Indianapolis Zoo.
Table 10	Family data from North Carolina Zoological Park.

Table A.2c

Other Data from Zoos and School Groups (England and USA)

Table number	Category of Data
Table 11	School Groups at Whipsnade.
Table 12	School Groups at Cincinnati Zoo.
Table 13	School Group at Indianapolis Zoo.

Data from the conversations of family groups are shown in the tables of Appendix 2b.

Table A.2d

Data from Family Groups at the Museum (museum animals and animatronics

Table number	Category of Data
Table 14	Families at the preserved animals Natural History Museum, London.
Table 15	Families at the animated models Natural History Museum London.

Data collected from schools groups looking at animals not as shown specifically as exhibits, but kept on a working farm are shown in theTable 2.2.16

Appendix 2. 2 Table 1

Prologue. 'Michael' Data (n=70)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										58	83
Exhibit access										56	80
Exhibit focused										70	100
Other Exhibit Comments							41	59	59		
setting				20	29	49					
labels				7	10	17					
direct involvement				0	0	0					
comments - exhibit furniture				27	39	66					
Animal focused							70	100	100		
body parts				32	46	46					
front end	16	23	50								
dimensions	20	29	63								
unfamiliar	5	7	10								
disrupters	5	7	10								
behaviour				51	73	73					
position	37	53	73								
movement	21	30	41								
food related	10	14	20								
attention attractor	19	27	37								
naming comments				69	99	99					
name/identity	52	74	75								
category	30	43	43								
compare	14	20	20								
mistake	3	4	4								
Affective attitudes							14	20	20		
emotive attitudes (like/dislike)				6	9	43					
human/animal interaction				10	14	71					
welfare				1	1	7					
Interpretative comments							70	100	100		
Is it real? alive?				0	0	0					
what is?				18	26	26					
reference to labels				7	10	10					
anthropomorphic				11	16	16					
knowledge source				19	27	27					
Environment							3	4	4		
habitat				2	3	66					
conservation				1	2	50					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 52 conversation units that include reference to the 'name/identity category' represent 74% of all 70 conversation units, and 75% of the 69 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 2

Schools. Live Animal Data. (n=459)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										354	77
Exhibit access										289	63
Exhibit focused										459	100
Other Exhibit Comments							227	50	50		
setting				82	18	36					
refernce to labels				53	12	23					
direct involvement				56	12	25					
models				1	0	0					
exhibit furniture				112	24	49					
Animal focused							459	100	100		
body parts				280	61	61					
front end	77	17	28								
dimensions	237	52	85								
unfamiliar	32	7	11								
disrupters	57	12	20								
behaviour				301	66	66					
position	177	39	59								
movement	130	28	43								
feeding	54	12	18								
attention attractor	115	25	38								
naming comments				401	87	87					
name/identity	318	69	79								
category	220	48	55								
compare	87	19	22								
mistake	17	4	4								
Affective attitudes							193	42	42		
emotive attitudes(like/dislike)				143	32	74					
human/animal interaction				72	16	36					
welfare				14	3	7					
Interpretative comment							443	97	97		
Is it real? Alive?				41	9	9					
what is?				83	18	19					
reference to labels				55	12	12					
anthropomorphic				100	22	23					
knowledge source				254	55	57					
Environment							19	4	4		
habitat				14	3	74					
conservation				5	1	16					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 318 conversation units that include reference to the 'name/identity category' represent 69% of all 459 conversation units, and 73% of the 401 conversation units that refer to at least one name/identity.

Appendix 2 .2 Table 3

Schools. Preserved Animal Data. (n=407)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/social										270	66
Exhibit access										219	54
Exhibit focused										407	100
Other Exhibit Comments							220	54	55		
setting				80	20	36					
reference to labels				60	15	27					
direct involvement				62	15	27					
models				39	10	18					
exhibit furniture				97	24	44					
Animal focused							405	99	99		
body parts				243	60	61					
front end	67	17	27								
dimensions	198	49	80								
unfamiliar	67	17	27								
disrupters	39	10	16								
behaviour				152	37	38					
position	69	17	45								
movement	40	10	26								
food related	28	7	18								
attention attractor	63	16	42								
naming comments				344	85	85					
name/identity	297	73	86								
category	232	57	67								
compare	164	40	48								
mistake	23	6	7								
Affective attitudes							158	39	39		
emotive attitudes(like/dislike)				145	35	92					
human/animal interaction				123	30	78					
welfare				9	2	6					
Interpretative comments							395	97	98		
Is it real? Alive?/real				65	15	16					
what is?				88	22	22					
reference to labels				60	15	16					
anthropomorphic				53	13	13					
knowledge source				296	73	75					
Environment							45	11	11		
habitat				38	9	84					
conservation				7	2	16					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 297 conversation units that include reference to the 'name/identity category' represent 73% of all 407 conversation units, and 73% of the 344 conversation units that refer to at least one name/identity

Appendix 2. 2 Table 4

Schools. Animated Dinosaur Models Data. (n= 422)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										304	72
Exhibit Access										239	57
Exhibit focused										422	100
Other Exhibit Comments							173	41	41		
setting				108	26	62					
reference to labels				24	6	14					
direct involvement				66	16	38					
about models				46	11	27					
exhibit furniture				79	19	46					
Animal focused							422	100	100		
body parts				309	73	73					
front end	113	27	37								
dimensions	173	41	56								
unfamiliar	59	14	19								
disrupters	162	38	52								
behaviour				363	86	86					
position	80	19	22								
movement	249	59	69								
food related	127	30	35								
attention attractor	182	43	50								
naming comment				176	42	42					
name/identity	147	35	84								
category	85	20	48								
compare	41	10	23								
mistake	6	1	3								
Affective attitudes							229	54	54		
emotive attitudes (like/dislike)				199	49	87					
human/animal interaction				64	15	28					
welfare				5	1	2					
Interpretative comments							400	95	95		
is it alive/real?				170	40	42					
what is?				51	12	13					
reference to labels				24	6	6					
anthropomorphic				97	23	25					
knowledge source				329	78	82					
Environment							19	5	5		
habitat				19	5	100					
conservation				2	3	22					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 147 conversation units that include reference to the 'lname/identity category' represent 35% of all 422 conversation units, and 84% of the 176 conversation units that refer to a name/ identity

Appendix 2. 2 Table 5

Families. London Zoo Data. (n =143)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										122	85
Exhibit access										123	86
Exhibit focused										142	100
Other Exhibit Comments							62	43	43		
setting				22	15	36					
reference to labels				14	10	22					
direct involvement				9	6	15					
exhibit furniture				29	20	47					
Animal focused							141	99	99		
body parts				75	53	53					
front end	17	12	23								
dimensions	62	43	83								
unfamiliar	7	5	9								
disrupters	15	11	20								
behaviour				95	66	67					
position	49	34	52								
movement	35	25	37								
food related	12	8	13								
attention attractor	30	21	32								
naming comments				126	88	89					
name/identitys	91	64	72								
category	57	40	45								
compare	62	43	49								
mistake	6	4	5								
Affective attitudes							29	20	20		
emotive attitudes (like/dislike)				10	7	35					
human/animal interaction				15	11	52					
welfare				5	4	17					
Interpretative comments							142	100	100		
Is it real? Alive?				6	4	4					
what is?				21	15	15					
labels				14	10	10					
anthropomorphic				34	24	24					
knowledge source				82	57	58					
Environment							20	5	5		
habitat				19	5	95					
conservation				1	0	10					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 91 conversation units that include reference to the 'name/identity category' represent 64% of all 143 conversation units, and 7% of the 126 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 6

Familes. Live animal Data. Rio Grande (n=65)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										49	75
Exhibit access										34	52
Exhibit focused										65	100
Other Exhibit Comments							23	35	35		
setting				10	15	44					
reference to labels				4	6	17					
direct involvement				0	0	0					
exhibit furniture				13	20	57					
Animal focused							63	97	97		
body parts				18	28	29					
front end	8	12	44								
dimensions	14	12	78								
unfamiliar	0	0	0								
disrupters	1	2	6								
behaviour				45	69	71					
position	27	42	60								
movement	17	26	38								
food related	2	3	4								
attention attractor	13	20	29								
naming comments				47	75	76					
name/identity	38	59	81								
category	24	37	51								
compare	7	11	15								
mistake	6	9	13								
Affective attitudes							24	37	37		
emotive attitudes (like/dislike)				13	20	54					
human/animal interaction				6	9	25					
welfare				1	2	4					
Interpretative comments							59	91	91		
Is it real? Alive?				0	0	0					
what is?				8	12	14					
ref to labels				4	6	7					
anthropomorphic				7	11	12					
knowledge source				43	66	73					
Environment							0	0	0		
habitat				0	0	0					
conservation				0	0	0					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 38 conversation units that include reference to the 'name/identitycategory' represent 59% of all 65 conversation units, and 81% of the 47 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 7

Families. Live Animal Data. St Louis (n=120)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										91	76
Exhibit access										82	68
Exhibit focused										119	99
Other Exhibit Comments							40	33	34		
setting				22	19	55					
labels				5	4	13					
direct involvement				0	0	0					
exhibit furniture				25	21	63					
Animal focused							119	99	99		
body parts				55	46	46					
front end	11	9	20								
dimensions	37	31	67								
unfamiliar	5	4	9								
disrupters	13	11	24								
behaviour				71	59	60					
position	41	34	58								
movement	34	28	48								
food related	2	3	4								
attention attractor	19	16	28								
naming comments				89	74	75					
name/identity	77	64	87								
category	55	46	62								
compare	12	10	14								
mistake	6	8	7								
Affective attitudes							27	23	23		
emotive attitudes (like/dislike)				18	15	67					
human/animal interaction				9	8	33					
welfare				0	0	0					
Interpretative comments							109	92	92		
is it alive?real?				11	9	10					
what is?				11	9	10					
reference to labels				5	4	5					
anthropomorphic				27	23	25					
knowledge source				35	29	32					
IEnvironment							2	2	2		
habitat				1	1	50					
conservation				1	1	50					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 77conversation units that include reference to the 'name/identity category' represent 64% of all120 conversation units, and 87% of the 89 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 8

Familes. Live animal Data. Caldwell Zoo, Tyler, Texas (n=74)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										59	80
Exhibit access										49	66
Exhibit focused										74	100
Other Exhibit Comments							16	22	22		
setting				12	16	75					
reference to labels				1	1	6					
direct involvement				0	0	0					
exhibit furniture				8	11	50					
Animal focused							72	97	97		
body parts				28	38	39					
front end	9	12	32								
dimensions	18	24	64								
unfamiliar	0	0	0								
disrupters	1	1	4								
behaviour				43	58	60					
position	35	47	81								
movement	11	15	26								
food related	2	3	5								
attention attractor	11	15	26								
naming comments				67	91	93					
name/identity	56	76	84								
category	45	61	67								
compare	12	16	18								
mistake	6	8	9								
Affective attitudes							20	27	27		
emotive attitudes(like/dislike)				13	18	65					
human/animal interaction				9	12	45					
welfare				0	0	0					
Interpretative comments							71	96	96		
Is it real? Alive?				2	3	3					
what is?				8	11	11					
reference to labels				11	15	15					
anthropomorphic				9	12	13					
knowledge source				45	61	63					
Environment							3	4	4		
habitat				2	3	67					
conservation				1	1	33					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 56conversation units that include reference to the 'basic name/identity category' represent 76% of all 74 conversation units, and 84% of the 67 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 9

Familes. Live animal Data. Indianapolis (n=116)

Number and per cent of the conversation units containing at least one mention of the category

category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										98	85
Exhibit access										79	68
Exhibit focused										116	100
Other Exhibit Comments							58	50	50		
setting				26	22	45					
reference tolabels				5	4	9					
direct involvement				6	5	10					
exhibit furniture				29	25	50					
Animal focused							116	100	100		
body parts				68	59	59					
front end	16	14	24								
dimensions	56	48	82								
unfamiliar	4	3	6								
disrupters	13	11	19								
behaviour				69	60	60					
position	63	54	91								
movement	28	24	41								
feeding	7	6	10								
attention attractor	16	14	23								
naming comments				83	72	72					
name/identity	71	61	86								
category	82	71	99								
compare	19	16	23								
mistake	2	2	2								
Affective attitudes							24	21	21		
emotive attitudes (like/dislike)				20	17	83					
human/animal interaction				10	9	42					
welfare				0	0	0					
Interpretative comments							109	94	94		
Is it real? Alive?				3	3	3					
what is?				8	7	7					
reference to labels				5	4	5					
anthropomorphic				21	18	19					
knowledge source				78	67	72					
Environment							0	0	0		
habitat				0	0	0					
conservation				0	0	0					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 71conversation units that include reference to the 'name/identity' category represent 61 % of all 116 conversation units, and 86% of the 83 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 10

Familes. Live animal Data. North Carolina Data (n=170)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										106	62
Exhibit access										120	71
Exhibit focused										170	100
Other Exhibit Comments							68	40	40		
setting				39	23	57					
reference to labels				12	7	18					
direct involvement				22	13	32					
about models				0	0	0					
exhibit furniture				43	25	63					
Animal focused							164	97	97		
body parts				64	38	39					
front end	7	4	11								
dimensions	40	24	63								
unfamiliar	5	3	8								
disrupters	11	15	17								
behaviour				106	62	65					
position	61	36	58								
movement	3	18	3								
food related	14	8	13								
attention attractor	39	23	37								
naming comments				126	74	77					
name/identity	117	69	93								
category	100	59	79								
compare	9	11	9								
mistake	8	5	6								
Affective attitudes							77	45	45		
emotive attitudes(like/dislike)				70	41	91					
human/animal interaction				14	8	18					
welfare				0	0	0					
Interpretative comment							156	92	92		
Is it real? Alive?				3	2	2					
what is?				19	11	12					
reference to labels				12	7	8					
anthropomorphic				27	16	17					
knowledge source				104	61	67					
Environment							3	2	2		
habitat				0	0	0					
conservation				3	2	100					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 117 conversation units that include reference to the 'lname/identity category' represent 69% of all 170 conversation units, and 93% of the 126 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 11
Schools. Live Animal Data. Whipsnade (n=197)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										150	76
Exhibit access										137	70
Exhibit focused										197	100
Other Exhibit Comments							107	54	54		
setting				61	31	57					
reference to labels				22	11	21					
direct involvement				26	13	24					
exhibit furniture				41	21	38					
Animal focused							197	99	99		
body parts				117	59	59					
front end	36	18	31								
dimensions	95	48	81								
unfamiliar	18	9	15								
disrupters	18	9	15								
behaviour				122	62	62					
position	77	39	63								
movement	55	28	45								
food related	20	10	16								
attention attractor	39	20	32								
naming comments				165	84	84					
name/identity	152	77	92								
category	131	67	79								
compare	41	21	25								
mistake	17	9	10								
Affective attitudes							60	31	31		
emotive attitudes (like/dislike)				28	14	47					
welfare				11	6	18					
human animal interaction				38	19	63					
Interpretative comments							188	95	95		
Is it real? Alive?				19	10	10					
what is?				41	21	21					
reference to labels				22	11	12					
anthropomorphic				30	15	16					
knowledge source				128	65	68					
Environment							15	8	8		
habitat				12	6	64					
conservation				3	2	20					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 152 conversation units that include reference to the 'lname/identity category' represent 77% of all 197 conversation units, and 92% of the 165 conversation units that refer to at least one name/identity

Appendix 2. 2 Table 12

Schools. Live Animals Data. Cincinnati (n=239)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										175	73
Exhibit access										144	60
Exhibit focused										236	99
Other Exhibit Comments							97	41	42		
setting				39	16	40					
labels				20	8	21					
direct involvement				15	6	16					
exhibit furniture				44	18	45					
Animal focused							235	98	98		
body parts				118	49	49					
front end	34	14	29								
dimensions	78	33	66								
unfamiliar	12	5	10								
disrupters	16	7	14								
behaviour				135	57	57					
position	70	30	52								
movement	59	25	44								
food related	23	10	17								
attention attractor	42	18	31								
naming comments				209	88	88					
name/identity	164	68	79								
category	97	41	46								
compare	110	46	53								
mistake	6	3	3								
Affective attitudes							88	37	37		
emotive attitudes (like/dislike)				87	36	99					
human/animal interaction				34	14	39					
welfare				7	3	8					
Interpretative comments							224	94	95		
Is it real? Alive?				15	6	7					
what is?				37	16	17					
reference to labels				20	8	19					
anthropomorphic				33	14	15					
knowledge source				93	39	42					
Environment							26	11	11		
habitat				13	5	50					
conservation				14	6	54					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 164 conversation units that include reference to the 'name/identity category' represent 68% of all conversation units and 79% of the 209 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 13

Schools. Live animal Data. Indianapolis (n=62)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										48	78
Exhibit access										40	65
Exhibit focused										62	100
Other Exhibit Comments							30	48	48		
setting				11	18	37					
labels				0	0	0					
direct involvement				1	2	3					
exhibit furniture				15	24	50					
Animal focused							62	100	100		
body parts				33	53	53					
front end	2	3	6								
dimensions	24	39	73								
unfamiliar	6	10	18								
disrupters	10	16	30								
behaviour				51	82	82					
position	27	44	53								
movement	18	29	35								
food related	5	8	10								
attention attractor	18	29	35								
naming comments				44	71	71					
name/identity	39	63	89								
category	37	60	84								
compare	4	7	9								
mistake	3	5	7								
Affective attitudes							21	34	34		
emotive attitudes (like/dislike)				21	34	100					
human/animal interaction				9	15	14					
welfare				2	3	10					
Interpretative comments							59	95	95		
Is it alive? real?				1	2	2					
what is?				3	5	5					
reference to labels				0	0	0					
anthropomorphic				19	31	32					
knowledge source				34	55	58					
Environment							1	1	1		
habitat				0	0	0					
conservation				1	1	100					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 39 conversation units that include reference to the 'label category' represent 63% of all 62% conversation units, and 89% of the 44 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 14
Families. Animated Dinosaur Models. Data (n= 176)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										147	84
Exhibit Access										91	52
Exhibit focused										176	100
Other Exhibit Comments							79	45	45		
setting				40	23	51					
labels				6	3	8					
direct involvement				17	10	22					
models				23	13	29					
exhibit furniture				13	7	17					
Animal focused							150	85	85		
body parts				96	55	64					
front end	13	7	14								
dimensions	58	33	60								
unfamiliar	19	11	20								
disrupters	34	19	35								
behaviour				119	68	79					
position	17	10	14								
movement	65	37	55								
food related	53	30	45								
attention attractor	66	38	56								
naming comments				84	48	56					
name/identity	73	42	87								
category	46	26	55								
compare	23	13	27								
mistake	0	0	0								
Affective attitudes							93	53	53		
emotive attitudes (like/dislike)				83	47	89					
human/animal interaction				31	18	33					
welfare				2	1	2					
Interpretative comments							136	77	77		
Is it alive? real?				63	36	46					
what is?				16	9	12					
reference to labels				6	3	4					
anthropomorphic				17	10	13					
knowledge source				116	66	85					
Environment							13	7	7		
habitat				13	7	100					
conservation				0	00						

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 73 conversation units that include reference to the 'label category' represent 42% of all 176 conversation units, and 87% of the 84 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 15

Families. Preserved Animals. Data (n= 184)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										142	77
Exhibit Access										108	59
Exhibit focused										184	100
Other Exhibit Comments							52	28	28		
setting				21	11	40					
reference to labels				6	3	12					
direct involvement				18	10	35					
models				9	5	17					
exhibit furniture				5	3	10					
Animal focused							181	98	98		
body parts				80	44	44					
front end	15	8	19								
dimensions	69	38	86								
unfamiliar	13	7	16								
disrupters	12	8	15								
behaviour				56	30	31					
position	19	10	34								
movement	12	7	27								
food related	13	7	23								
attention attractor	26	14	46								
naming comments				167	91	92					
name/identity	154	84	92								
category	126	69	76								
compare	46	25	28								
mistake	22	12	13								
Affective attitudes							64	35	35		
emotive attitudes (like/dislike)				41	22	64					
human/animal interaction				26	14	15					
welfare				1	3	2					
Interpretative comments							177	96	96		
is it alive?real?				18	10	10					
what is?				34	19	19					
labels				6	3	3					
anthropomorphic				8	4	5					
knowledge source				128	70	72					
Environment							16	9	9		
habitat				13	7	81					
conservation				4	2	16					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 154 conversation units that include reference to the 'name/identity category' represent 84% of all184 conversation units, and 92% of the 167 conversation units that refer to at least one name/identity.

Appendix 2. 2 Table 16

Schools. Live Animals at a farm (Burchetts Green). Data (n= 248)

Number and per cent of the conversation units containing at least one mention of the category

Category	n	%	%*	n	%	%*	n	%	%*	n	%
Man/Social										196	71
Exhibit Access										96	39
Exhibit focused										248	100
Other Exhibit Comments							91	37	37		
setting				32	13	19					
labels				0	0	00					
direct involvement				50	20	29					
models				00	0	0					
exhibit furniture				27	11	16					
Animal focused							244	98	98		
body parts				139	56	57					
front end	46	19	33								
dimensions	100	40	72								
unfamiliar	32	13	23								
disrupters	73	29	53								
behaviour				129	52	53					
position	34	14	26								
movement	29	12	23								
feeding	43	17	33								
attention attractor	60	24	47								
naming comments				105	42	43					
name/identity	89	30	85								
category	78	32	74								
compare	29	12	28								
mistake	2	1	2								
Affective attitudes							153	62	62		
emotive attitudes(like/dislike)				113	46	73					
human/animal interaction				65	26	43					
welfare				13	5	8					
Interpretative comments							196	79	79		
Is it real? Alive?				13	5	7					
what is?				8	3	4					
labels				0	0	0					
anthropomorphic				59	24	30					
knowledge source				83	51	52					
Environment							1	1	1		
habitat				0	0	0					
conservation				1	100	100					

% indicates per cent of all comments; %* indicates the percent of all those comments included in the next highest category. Thus the 89 conversation units that include reference to the 'name/identity category' represent 30% of all 248 conversation units, and 85% of the 105 conversation units that refer to at least one name/identity.

References Appendix 2

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APPENDIX 3

VISITS TO ZOOS IN ENGLAND AND THE USA

Chapters 4 to 8 within the main thesis have considered data obtained from either family groups or school groups in one zoo, London Zoo, with data obtained from similar groups looking at animal specimens of a different nature in another location, the Natural History Museum, and with data obtained during farm visits to look at animals that were not 'exhibited' but merely available to be viewed. Is the content and form of the conversations of family groups and school groups visiting animal specimens within zoos in the USA different from those in England? Differing cultural contexts are of inherent interest. Additionally, research from the USA in the field of visitor studies is applied to situations in England but we do not know whether this is valid.

Teachers, and the chaperones present on school visits, were not relating exhibits and the form and functions of animals to each other. Nor were children learning one of the fundamental concepts of life, the energy chain, meat eaters eat plant eaters which eat plants and obtain the energy captured by them from the sun through the process of photosynthesis. The lack of teaching and talking science presents a challenge to zoos and natural history museums.

This appendix will discuss the data obtained from school groups visiting zoos within the same country, England, and, secondly, data obtained from school groups within a different country, the USA. The overall data obtained for school groups and for family groups in each country will be compared. Finally, as zoos in the USA and England have the conservation of endangered species and disseminating the information about their work and the endangered status of species within the zoo as their main objective (IUZDG 1993), I shall consider whether the data collected for this study provides any evidence that the message is reaching the audience of school and family visitors and whether the visitors are interested in this topic whilst at the zoo.

1. COMPARISON OF SCHOOL DATA

A.3.1.1 England

Table A.3.1

Comparison of content of conversations at London Zoo and Whipsnade (main categories)

Category	London Zoo n=459		Whipsnade n=197		χ_1^2	Probability	Phi ^{2}
	no	%	no	%			
Mngt./ Social	354	77	150	76	0.08		
Exhibit access	289	63	137	70	2.62		
Other exhibit comments	227	50	107	54	1.30		
Body parts	280	61	117	59	0.15		
Behaviours	301	66	122	62	0.80		
Naming	401	88	165	84	1.52		
Affective attitudes	193	42	60	31	0.31		
emotive attitudes	143	32	28	14	47.81	$p<<0.005$	0.07
Interpretative	443	97	188	95	0.44		
real/alive	41	9	19	10	0.08		
knowledge source	254	55	128	65	5.26		
Environment	19	4	15	8	3.39		

A pattern for content of conversations generated by school groups at live animal exhibits was considered in detail in Chapter 4. In this section that data from London Zoo is compared with data obtained within the other animal collection owned by the Zoological Society of London, Whipsnade Wild Animal Park, Dunstable, Bedfordshire (Table A 3.1). Consideration of the data presented in Table A 3.1 shows that there was an overall similarity in the content of the major categories of conversational topics in the two animal collections. However, it is interesting that there was a significantly lower number of conversations with at least one comment about emotive attitudes generated at Whipsnade. A consideration of the demographic origins of the schools that visited London and Whipsnade (Appendix 1), and whose conversions were analysed for their content, shows that the children came from similar areas but that there were more 'inner-city' children visiting London Zoo. A number of the schools that visited London Zoo used public transport - buses and the underground trains - to reach the zoo, whereas Whipsnade can only be visited by using road vehicles and there is no convenient public transport available, necessitating the expensive hire of a coach by schools, rendering such visits out of reach of some schools who can only afford to visit places using public transport.

The different proportions of conversations containing emotive comments could be caused by the lack of experience of the inner city children in seeing animals and to which an emotive response was given as the first level of verbal reaction. However, yet a higher content of emotive conversations was found within the farm data. This suggests that an emotive reaction was generated when there was a lack of overt educational rationale and guidance for groups in their task at the animals, because the number of the children visiting the farm were from rural areas and were familiar with farms. More conversations with knowledge source comments were generated at Whipsnade, this finding may reflect the higher number of teacher-groups from which data were collected.

Table A.3.2

Comparison of content of conversations at London Zoo and Whipsnade (Animal observations)

Category	London Zoo		Whipsnade Wild Animal Park		χ_1^2	Probability	Phi ^{2}
	n= 459		n =197				
	no	%	no	%			
Body parts	280	61	117	59	0.15		
front end	77	17	36	18	0.22		
dimensions	237	52	95	48	0.64		
unfamiliar	32	7	18	9	0.92		
disrupters	57	12	18	9	1.47		
Behaviour	301	66	122	62	0.80		
position	177	39	77	39	0.02		
movement	130	28	55	28	0.01		
feeding	54	12	20	10	0.36		
attractors	115	25	39	20	2.12		
Naming	401	88	165	84	1.51		
label	318	69	152	77	4.2		
category	220	48	131	67	19.10	$p<0.005$	0.03
compare	87	19	41	21	0.30		
mistake	17	4	17	9	6.80	$p< 0.01$	0.01

The data in Table A3.2 shows that content of conversations generated in the two English zoos about direct animal observations was almost identical. However, Whipsnade groups allocated the animals to a category, e.g. bird, reptile, significantly more than did the London Zoo school visitors and made mistakes in naming significantly more often. Detailed analysis of the three social subgroups within the school groups at Whipsnade shows that each group within the school parties categorised the animals to the same extent (66% children-only groups, 70% teacher-groups 74% chaperone-groups, χ_{2}^{2} 0.64). Furthermore, demographic data obtained at Whipsnade from group leaders showed that some of the school visits were organised by primary school teachers who were zoology graduates. The preparation provided by them to both children and other adults could account for the increase in categorisation comments. The data suggest that the Whipsnade groups possessed a more acute focus on the animals. Cues for conversation which focus the attention of all groups upon naming topics and other attributes, that they were unlikely to have commented on if not prompted, may be a combination of worksheets, preparatory work, well briefed adults, and labels that 'invite' children to read. The following exchange between year 6 boys at Monitor Lizards illustrates the focusing on particular attributes of animals through a cue - a worksheet.

Boy 1: Are these them?
Boy 2: Monitor Lizards.
Boy 1: Ah yes, rough scaly skin- that helps. (referring to worksheet)
Boy 3: Their skin.
Boy 2: We do it on the next page (of worksheet).

Mistakes in naming animals were made to the same extent by all the subgroups at Whipsnade, (χ_{2}^{2} value 0.84). However, the number of chaperone-groups that contributed to the data was comparatively low, 19 groups out of the 197 and if a higher number of such groups had contributed to data the significance of the results may have been altered.

Falk (1983) argues that visitors have a time budget at an exhibit and leave after it 'expires', whereas Hensel (1987) suggested that people have an 'conversational topic budget' that controls the time spent at an exhibit. The Whipsnade data suggest that a focus on the animals and having a topic to look for increases the content of the conversation in animal related topics and reduces those of an emotive nature. The data from both English Zoos shows that a striking similarity existed in conversational content .

A 3.1.2 USA

Cultural differences do exist between the USA and England besides differences in semantics. It is salutary to recall the work of Kellert and his associates which showed that USA citizens have a dominstic and utilitarian attitude to animals and hunting is one of the most popular sports (Kellert 1979; Kellert and Berry 1980; Kellert 1980; Kellert and Westervelt 1981).The public (i.e. state) schools neither teach religious instruction for example, nor hold assemblies with an act of worship. These examples are used to emphasise that there may be differences within the school system that could affect the topics focused on animals about which school groups comment. However, within the two countries many similar aspects of culture are shared, especially pop music, television programmes and films, so that it is expected that there would be an overall similarity in the content of conversations generated by the school groups while observing animals in zoos. A number of school groups studied in England contained children for whom English was not their first language but this situation was not observed in the school groups worked with in Cincinnati Zoo and Botanical Gardens or Indianapolis. Indianapolis Zoo is relatively new, built within the last decade, compared with Cincinnati which is the oldest zoo in terms of its buildings in the USA (Ehrlinger 1993) although Philadelphia Zoological Society was the first to be formed.

Table A.3.3

The content of conversations of school groups at two USA zoos.

Category	Cincinnati Zoo n = 239		Indianapolis Zoo n = 62		χ_1^2	Probability	Phi^2
	no	%	no	%			
Mngt./social	175	73	48	78	0.44		
Exhibit access	144	60	40	65	0.38		
Other exhibit	97	41	30	48	1.13		
Body parts	118	49	33	53	0.29		
Behaviour	135	57	51	82	6.61	$p<0.005$	0.02
Naming	209	88	44	71	9.97	$p<0.005$	0.03
Affective attitudes	88	37	21	34	0.19		
emotive	87	36	21	34	0.14		
Interpretative	224	94	59	95	0.18		
real/alive	15	6	1	2	N/A		
knowledge source	93	39	34	55	5.12		
Environment	26	11	1	1	N/A		

Table A3.3 shows that there was a similarity in the number of conversations at both zoos in which major topics were mentioned at least once. However, significant differences occurred between the two zoos. More conversations referred to behaviour in Indianapolis and more to names in Cincinnati. Moreover, there was a higher content of conversations which referred to the environment at Cincinnati, but the data is insufficient for a meaningful analysis. More conversations containing at least one knowledge source comment were generated in Indianapolis but are significant only at the 0.025 level.

Table A3.4 shows that there was overall similarity in numbers of conversations with comments about direct animal observations, although there was insufficient data in five of the subordinate categories so that a chi-squared test could not be applied. However, there were some significant differences between certain categories of conversational content and these may have been the result of the emphasis that the school groups gave.

Table A3.4

The content of conversations of school groups at two USA zoos (Animal observations)

Category	Cincinnati Zoo n = 239		Indianapolis Zoo n =62		χ_1^2	Probability	Phi ^{2}
Body parts	118	49	33	53	.29		
front end	34	14	2	3	N/A		
dimensions	78	66	24	39	0.81		
unfamiliar	12	5	6	10	N/A		
disrupters	16	7	10	16	N/A		
Behaviour	135	57	51	82	13.85	$p<0.005$	0.05
position	70	52	27	44	4.58		
movement	59	25	18	29	0.49		
feeding	23	10	5	8	N/A		
attractors	42	18	18	29	4.05		
Naming	209	88	44	71	9.97	$p<0.005$	0.03
identity	164	68	39	63	0.73		
category	97	41	37	60	7.26	$p<0.01$	0.02
compare	110	46	5	8	30.04	$p<<0.005$	0.1
mistake	6	3	3	5	N/A		

Table A3.4 also shows that the Indianapolis groups focused both on behaviour and categorisation of animals, whereas the Cincinnati groups focused on naming, in particular comparing animals with both the human form and other animals. Such differences did not appear within the English data. Is there a plausible explanation? The children from the Indianapolis school visited the school each year and were familiar both with the appearance of the animals and their identity and they categorised the animals into a group, e.g. cats, reptiles, fish. Moreover, in the walk between exhibits, the teacher and other adults reminded the children what they would see next and the children talked about what they remembered, hence the need to identify the animals was rendered largely unnecessary. Several of the school groups which visited Cincinnati Zoo and Botanical Gardens were focusing on the variety of animal life, both naming specimens and describing them through making comparisons. The particular emphasis on the conservation of endangered wildlife and the endangered status of the animals given at Whipsnade and Cincinnati and apparent within the data (Appendix 2b). Although there was extensive conservation information provided at Indianapolis, and in particular at London Zoo, such content was not seen in the data. If the message were received, it was not discussed, either because of lack of interest or because it had been understood during previous visits. It is interesting to note the differences within conversations that *can* occur at two different zoos within the same country. It must, however, be remembered that London and Whipsnade are very close to each other geographically and that England is smaller than either of the two states in which the two USA zoos considered here are located. Therefore greater differences might be expected between the USA zoos than the two English zoos because of the likely greater inter-state differences (Ohio and Indiana) due to initiatives and legislation.

Such differences in conversational content can also be explained by other local factors such as the outreach policy and style of labels of the zoo. Cincinnati Zoo has an active Cats programme which takes live specimens of endangered species, such as a cheetah, into schools and other groups within the community to talk about the conservation programmes and policy of the zoo. Furthermore, Cincinnati Zoo has a high school on its premises which attracts media attention and highlights public awareness of the work of the zoo. The information labels in the zoo bear a clear emblem to signify the endangered status of the animal and showcases of confiscated goods made from parts of the bodies, especially the skins, were located within the animal houses and attracted the attention of some of the school groups who discussed the issue put forward by the zoo through the information labels provided.

The data in Table A3.5 shows that a surprising similarity existed in the proportions of the conversations generated by school groups at zoos. This is not surprising, the educational system in both countries expect the children of the primary/elementary schools to study the variety of life in their science courses. However, the English schools referred significantly more to knowledge source comments Table A3.5). Schools generated significantly more emotive comments tna did family groups. There is a tendency ($p<0.25$) for USA groups to comment on the exhibits less, focusing more on the animals, and a significant difference existed between the two sets of data for the number of conversations about body parts. This greater emphasis within the English data with body parts is difficult to explain other than arguing that either the groups lacked familiarity in looking at live animals and made related observational commentaries or were expected to focus on looking at the body parts of animals. Alternatively, the focus of the visits in the

USA groups could plausibly have been on other aspects, behaviour for the Indianapolis children and aspects of conservation for some of the Cincinnati groups. If we consider that Falk's suggested time budget at any exhibit and Hensel's 'Topics to talk about' limitation were operating, the focus on body parts in England or behaviour in the USA would limit other discussion. It is of interest to note that USA school groups referred to more conservation topics and that this phenomenon was due to the number of comments passed at Cincinnati zoo.

A3.2 CONVERSATIONS OF FAMILIES IN ZOOS IN ENGLAND AND THE USA

An overall comparison of the main topics of conversations between the data collected in the USA the UK was made for both school and family visits (Tables A3.7 and A3.8). The proportion of conversations about either the environment-natural habitat of the animal and conservation topics, or the body parts, behaviours and names of the animal were identified groups (Tables A3.5. and A3.6). The total value for topics within each *country* was used.

The data in Table A3.6 shows that families at London Zoo employed more management/ social comments, exhibit access, interpretative comments and used names for animals more within their conversations than did the USA samples. Conversely, the USA families generated affective attitudes, including emotive ones, to a significantly greater extent. Environmental comments were few, but had data about families been collected in Cincinnati Zoo and Whipsnade, it may have shown that families commented about conservation to a greater extent than in other zoos, as was the case with the schools visitors. This difference in the number of conservation topics reflected a local phenomenon and not a national trend.

Families visiting London are thought to be of a higher socio-economic groups than families elsewhere in England (Ament 1994) and it is possible that a different picture of the conversational content of families would be acquired had data been obtained from other zoos in England. The higher number of ‘exhibit access’ conversations made by the London families suggests that either their members were less familiar with the zoo and the exhibits, and therefore not likely to be repeat visitors, or alternatively, the exhibits may have been better designed in the USA so that the need for this type of conversation could have been less. The London families appeared to be more determined in their viewing, expressing more exhibit access and naming comments together with more management/social comments. This suggests that the families made a concentrated approach to both *see* and *identify* animals which may be a phenomenon associated with families who visited the zoo infrequently and hence had a lack of familiarity with the exhibits and the animals, or reflect the rationale for their visit and how this was interpreted by these visitors.

A.3.3 OVERALL COMPARSON OF THE CONVERSTATIONAL CONTENT OF FAMILY AND SCHOOLS GROUPS VISITING ZOOS IN THE USA AND ENGLAND

Overall, the general pattern of conversational topics generated by families and schools in the USA and England was similar. This similarity can be seen in Figure A3.1 which shows the shared emphasis in conversational content for visitors to zoos but highlights the few significant differences - a greater emphasis on affective attitudes in the USA and more knowledge source within the conversations of English schools . London families had an emphasis on looking for the animal (exhibit access), controlling and acknowledging each other (management /social). The use of other aspects of the exhibits was shown by both sets of school data and the London families.

Figure A.3.1

Main topics - schools and families in USA and England

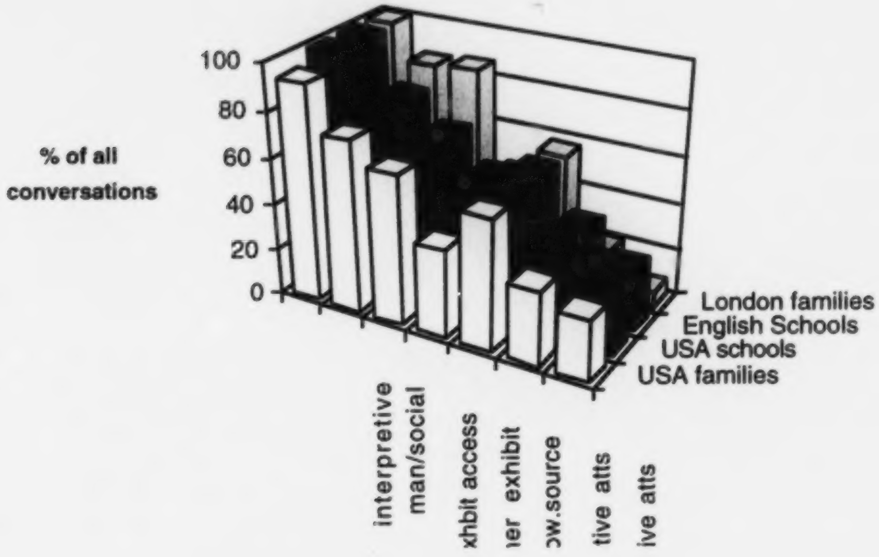
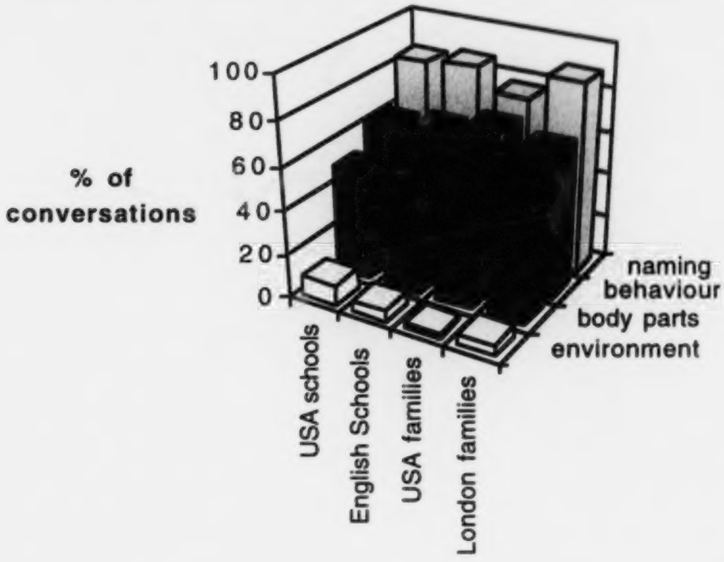


Figure A3.1 shows the emphasis shared by all groups in the different comments generated whilst looking at the exhibits not concerned with direct animal observations. Almost all conversations contained an interpretative comments, and over two thirds a management or social comment. Exhibit access comments was the next most frequently referred to category, followed by comments about other aspects of the exhibit and affective attitude remarks. Knowledge source comments are a subcategory of interpretative ones and are an indicator of the occurrence of educational tasks. The figures for such comments are included separately because of the significance in the type of interpretation that occurs within groups.

Figure A3.2

Schools and families in USA and England (animal observations)



Comments derived from direct observations of animals were mostly about naming, followed by utterances concerning behaviours and then body parts. Both school and family groups noticed the body parts and behaviours and used names to identify the animals.

Fig A3.2 shows that environmental issues were the least discussed major topic. This is unfortunate. Zoos assume that visitors are interested in that in which they themselves are

[redacted]

(Brisbin 1993[redacted]; Brambell 1993) and they assume 'in one way or another they (the visitors) have an interest in animals'(page 1 Chapter 4, IUDZG and IUCN/SSC 1993). Visitors arrive at a zoo with both knowledge and attitudes about animals and associated issues. However, hitherto the nature of 'this interest' has not been explored and therein lies the problem. If the details of the interests of visitors were known, they could be the starting point in developing public understanding about biological conservation but the zoo needs to both know and understand what are the interests.

The data presented in this appendix show that school and family visitors had some interest in animals and categories and named them, commented on attributes and interprettedthe animals within their own experiences. Moreover, visitors not only looked at the animals but the total exhibit and the setting in which the specimens were located. However, the data show that, whilst looking at animals as exhibits, visitors were not interested in discussing either conservation and the natural habitat of the animals, nor incidentally the diet of the animal. Such findings should be of concern to zoos because their conservation message is not reaching these large segments of their audience.

Overall, the pattern of the content found within conversations generated in two different countries was similar, therefore data collected within one country could be applied to the interpretation of data collected within another of a similar culture.

However, there were local discrepancies within national data of which researchers must be aware.

Summary

There is similarity in the topics that were discussed by children and their adults on both school and familiy leisure visits, in both England and the USA. Visitors had a need to interpret the exhibits, once they had located the animals. They commented about other aspects of the exhibit in just under half of all exchanges and made a management/social utterance in over two thirds. Affective comments, whilst present, were not a particularly large category of comment. Naming the animals was the predominant activity and comments on their behaviour were made in about two thirds and body parts in about half of all exchanges. However, the data show that there was a dichotomy of purpose between the interests of zoos and that of their visitors. On the one hand zoo management saw their task as one of conservation whilst on the other hand the visitors were not overtly concerned about this issue and made their visit to the collections to 'see the animals'. The data presented show that the transference of the finding of research on a similar topic in one of the two countries, USA and England, can be applied in the other country.

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APPENDIX 4

ACROSS THE POND - THE CONTENT AND FUNCTION OF FAMILY CONVERSATIONS AT ZOOS

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Paper given at Visitor Studies Conference, Raleigh, NC. July 1994

INTRODUCTION

Zoos, like museums, are places of learning

conversations (Lucas, McManus and

Thomas 1986) and some of the conversations are about animals. Furthermore, parents state that they take their offspring to the zoo to 'learn about animals' or to see or experience the 'real animal' (Hill 1971; Rosenfeld 1980:39). It is likely that, in accordance with behaviour noted amongst families in museums, the groups in a zoo talk about the exhibit and let the exhibits set the agenda rather than bringing one with them (Hilke, 1988).

Children learn how to be part of conversations, they 'enter into meaning' (Bruner, 1990:68). Learning a language is, as Bruner (1990:70) reminds us using John Austin's phrase, 'learning how to do things with words'. The initial care giver is crucial in helping a child learn language and Nelson [redacted](1974)

[redacted] identifies four stages in the acquisition of a concept. The last stage is attaching a name to the concept and, in helping children achieve this stage, adults point out an object and name it. Moreover, the child understands that the *whole* object is being referred to and not a part of it

(Ninio

1980)

The form and function of a conversation are likely to reflect the age of the children concerned and the objectives behind it. Bruner (1983:76-79) observed the specific 'labelling' pattern of conversations. The characteristic sequence of utterances is between a very young child and the care giver, usually the mother. The sequence has four stages of different forms of utterance, attentional- vocative (e.g. Look!, query, (Do you know what this is?), label (It's a bear) and feedback when the child has repeated the word (Well done!) made by the care giver. Adults with older children adopt another characteristic pattern of conversation referred to by Wheldall and Glynn (1989:134-142) as 'motherese'. Hensel (1987:100-104) identifies Teaching-Learning conversations amongst the dialogues she recorded of families in an aquarium. These were recognised through identifying a typical question/answer dialogue that is very similar to both the Teaching-discourse of 'initiation/response/feedback' sequence of utterances identified by Sinclair and Coulthard (1975) and Triadic Dialogue (Lemke 1990:11). But what are all the topics about which the families talk? Are these patterns of conversation present during a family zoo visit and is there a distinct conversational pattern that can be identified for families with elementary aged children?

The first words of children are taught by their care givers and have been identified as

nouns or 'names for things'. In Rinsland's

(1946) study, reported by Anglin

(1977:71[redacted]), thirty six of the first two hundred and seventy five names of objects learnt were related to animals. This was the highest frequency in any category. Moreover, it is likely that parents and other adults teach children the names for the animals during a zoo visit and do so in an ostensive manner as Ninio reports for the home surroundings.

Rosenfeld (1980:60) observed that family visitors in a zoo talked about the names of the animals, their body structures and behaviours and their relationships and tried to instigate reactions in the animals. Infrequently there were discussions between visitors during which they reflected thoughtfully about the animals. Taylor (1986) and Hensel (1987) reported that visitors in Aquaria both name animals and comment on body parts and behaviours.

Since we know that the overall pattern of conversations between families at London Zoo and St Louis Zoo is similar (Tunnicliffe 1993a) a deeper analysis of conversations is also likely to be generalisable within the theoretical framework proposed for the development of children's conversations.

This present study sought to identify the content and patterns of family conversations in five different zoos, one in England the others within the USA.

PROCEDURE

The research project sought to establish, through ethnographic methodology, a description of what primary aged children and their accompanying adults talked about when looking at animal exhibits in zoos during a family or leisure visit. Data was collected in both London Zoo, England and the USA in St. Louis during 1991-1992 (Tunnicliffe 1993a) and in Caldwell, Indianapolis and Rio Grande Zoos during July and September 1993. St Louis and Caldwell zoo were free of charge and the other two charged an entry fee, $ 6.00 and $2.20 respectively at the time of data collection. All the zoos used in the study show animals from all the classes of vertebrates and a large number of the main invertebrate classes.

I accompanied children and their adults and recorded their spontaneous conversations after receiving permission to do so from the zoo. I stood behind the groups of children and their accompanying adult and moved with that group or stayed at an exhibit and listened to another group as was appropriate. A number of parents were asked if their conversations could be recorded. They all agreed and it was assumed that those who were not asked would have agreed.

The tape recordings and field notes were transcribed. Each unit of conversation is defined as the 'group conversation in front of any one exhibit from the beginning of the conversation until it ceased', were identified in the transcripts. A unit of conversation is shown below.

Girl (7 yrs): Where is the bird where?
Adult : In a tree
Girl : Which one?
Adult : There it is right up there just inside

Each conversation was coded according to a systemic network (Bliss, Ogborn and Monk 1983] which is a type of analysis that changes qualitative into quantifiable data and had been worked out previously (Tunnicliffe 1993a). The results of this process were entered into a worksheet of a statistics package into a Minitab statistics package (Minitab Inc. 1991), with a 1 scored for the occurrence of a category in a conversation (Fig 1).

RESULTS

The results were analysed into the main categories defined in Tunnicliffe 1993a. These categories are: 1. exhibit focused; 2. exhibit access (seeking something at which to look); 3. animal focused comments, which are either direct observations about the animal, e.g. body parts or behaviours or interpretations and attitudes about the animal; 4 comments about other aspects of the exhibit and 5. management and social comments. The categories are not mutually exclusive so that percentages need not add up to 100%.

The proportions of conversations in the USA zoos and London Zoo were considered. For the USA zoos the data of each category was considered by calculating the χ^2 values for the 4 zoos by using a 4 x 2 contingency table with the site as one dimension and the other being the presence or absence of comments in the category being considered. In only one case was there significant associations between site and comment. The proportion of comments for the other topics showed sufficient homogenity to be considered as one group for the sake on comparison with the London data(Tables 2 and 3).

Table 1: Example of a 2 x 2 Contingency Table to show the principle used for the Analysis

	Some Exhibit Access Comments	No Exhibit Access Comments	Total
Total USA	244	131	375
London	123	20	143
Total	364	152	516

χ^2 1DF= 21.99 $p<0.005$

Table 2:
Main Topics of Family Conversations at Live Animal Exhibits:
Main topics (percentages of total conversations)

Zoo	exhibit focused		other exhibit comment		animal focused		exhibit access		man/social	
	no	%	no	%	no	%	no	%	no	%
Rio Grande n=65	65	100	23	35	63	98	34	52	49	75
St Louis n=120	119	99	40	33	119	99	82	68	91	76
Caldwell, Tyler n=74	74	100	16	22	72	97	49	66	59	80
Indianapolis n=116	116	100	58	50	116	100	79	68	98	85
χ_3^2	2.13		18.92 ($p< 0.005$)		4.35		4.97		3.30	

Table 3:

Main Topics of Family Conversations in the USA Zoos compared with the London Zoo data ('Other' exhibit comments omitted)

Total	exhibit focused		animal focused		exhibit access		man/social	
	no	%	no	%	no	%	no	%
Total USA n=375	374	100	370	99	244	65	270	72
London n=143	142	99	141	99	123	86	122	85
χ^2 (total s 1DF)	0.50		0.00		21.99 $p < 0.005$		2.50	

Animal focused topics have three main constituent categories: body parts, behaviours and names. Families comment in similar proportions about animal focused topics in all zoos (Table 4) except that the London families used some type of name for the animals in their conversations to a statistically significantly greater extent than the USA families.

Table 4:

Main topics of animal-focused topics

Family Visits in the UK and USA

Zoo	body parts		behaviours		names	
	no	%	no	%	no	%
Rio Grande n=65	44	70	45	71	47	72
St Louis n=120	55	46	71	59	89	71
Caldwell n=74	28	38	43	58	67	91
Indianapolis n=116	68	58	69	60	83	72
Total USA n=375	195	52	228	61	286	76
London n= 143	75	53	95	66	126	88

The content of family conversations is similar in the English Zoo and in the four USA zoos. The results presented in Tables 2-5 show that overall there is a similarity in both the content and proportions of the conversations of families at zoos in the USA and London. However, there are local differences which are difficult to explain from the data available. Families at London and Caldwell categorised the exhibits to a significantly greater extent than the visitors to the other zoos Two thirds of conversations at Rio Grande referred to the main animal focused topics whilst St Louis and Caldwell families made far fewer comments inthe same category. Indianapolis families passed more comments about other features of the exhibits than family groups in other USA zoos but in approximately the same proportions as the London families.

Table 5:

Total of USA Body Part Categories compared with the London Zoo

Totals		body parts		behaviours		names	
		no	%	no	%	no	%
Total USA	n=375	195	52	228	61	286	76
London	n=143	75	53	95	66	126	88
χ_1^2		$\chi 2 = 0.01$ not significant		$\chi 2 = 1.40$ not significant		$\chi 2 = 8.92$ sign. $p < 0.005$	

DISCUSSION

Families in the USA and London comment about the same categories of topics when looking at live animals but the London and Indianapolis families commented to a significantly greater extent about 'other exhibit features', suggesting that those groups were more used to looking at the whole exhibit and were not captivated solely by the animal. The results suggest that, whilst there is an overall homogeneity in the content and proportions of comments amongst families visiting a zoo there is not a particular 'national' characteristic between the USA and England, there are important local trends.

The form of conversations amongst the families studied in the USA and England were similar. The transcripts show that distinct forms of conversation identified by other researchers, e.g. Bruner (1983), Wheldall and Glynn (1989) Hensel (1987) Sinclair and Coulthard(1975); Lemke (1990) are used by adults when talking to children of particular stages of development in both countries. Most of the conversations fall into Level 3 (Table 6) as the majority of family groups contained a child who was able to converse at this level.

Some conversations occur because people are together and function for social bonding (phatic conversations). It is not possible to distinguish phatic conversations from the conversations about animals that are made because some are 'animal focused'. Social conversations (terminal 3 in network) may be totally irrelevant to the visit focus and some children may use words e.g. 'Tiger' to indulge in word play whilst at the exhibits. The conversations appeared to have a role in teaching the children in a zoo learning sequence.

The predominant interest of visitors within all their conversations appears to be naming the animal. However, visitors prefer to use the everyday name which they know rather then seek out the scientific name although the English version of the scientific name is used in some instances. Usually these instances are when one of the group asks what the animal is or identifies the animal with the everyday name amplifying the statement with the scientific name. Visitors tend to use the middle level everyday name for animals which is at the family/order level rather than subordinate (species) or superordinate (class or phylum) level terms.

Table 6

Main forms of conversation used at animal exhibits by families

Level	Characteristic conversational form	
Level 1 babies/toddlers		‘LABELLING’ Mum: Do you know what that is? It's a Kookaburra Child: Kookaburra Mum: Well done!
Level 2 pre-school		‘MOTHERESE’ Mum: Look! a birdie!
Level 3 school aged	INVERSE TRIADIC Michael: What's that? It looks like elephant pooh! Aunt: That's right, and there are beetles which live in it. Michael: Ergh!	FORMAL LEARNING Mum: Look at this guys! He's a Yellow Head. Boy: Where? Mum: It's right there.

Table 6: The pattern of conversations alters with the age of the child. Very young children are being taught ‘labels’ for things, older children are talked to in simpler language often using ‘baby’ words (motherese).

These observations are not surprising. Children learn the middle level of any taxonomic hierarchy first of all (Cameron 1994) and Berlin [redacted] (1973; 1978) [redacted] found that the family level of naming was the most prevalent in certain less developed societies of an eastern island. There are no 'specific 'zoo' teaching behaviours but the pattern of 'labelling' and 'motherese' are the same as those that occur in other settings studied by developmental psychologists interested in language acquisition.

Conclusion

Although there are significant differences in some aspects of conversations between children and adults visiting London Zoo and various zoos in the USA, there is an overall similarity between the two countries. It is possible that the major differences are attributable to the high familiarity of visitors to the USA zoos, which tend to have more repeat visitors than does London, but overlying these differences are a number of features in common. The zoo is a setting in which the generally observe patterns of discourse with young children in the process of acquiring language are displayed, and indeed, zoo visits can contribute to, or be constant with, the high frequency of animal related words among those first acquired by learners.

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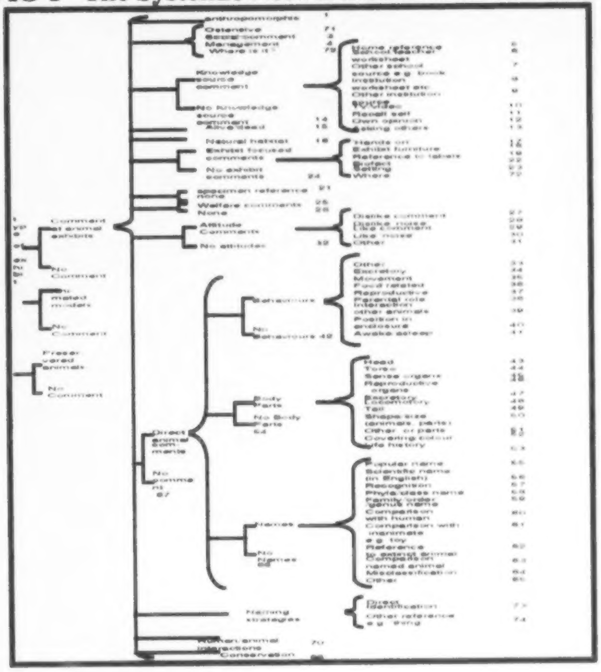
FIG 1 The Systemic Network used in the research


anthropomorphs 1
Offensive 71
Social comment 3
Management 4
Where is it? 79
Knowledge source comment
No knowledge source comment 14
Alive/dead 15
Home reference 5
School teacher worksheet 6
Other school source e.g. book 7
Institution worksheet etc 8
Other institution source 9
TV/video 10
Recall self 11
Own opinion 12
Asking others 13
Natural habitat 16
Exhibit focused comments
No exhibit comments 24
Hands on 17
Exhibit furniture 18
Reference to labels 19
Subject 22
Setting 23
Where 72
specimen reference 21
none
Welfare comments 25
None 26
Type of exhibit
Comment at animal exhibits
No Comment
Animated models
No Comment
Preserved animals
No Comment
Attitude Comments
No attitudes 32
Dislike comment 27
Dislike noise 28
Like comment 29
Like noise 30
Other 31
Behaviours
No behaviours 42
Other 33
Excretory 34
Movement 35
Food related 36
Reproductive 37
Parental role 38
Interaction other animals 39
Position in enclosure 40
Awake asleep 41
Body Parts
No Body Parts 54
Head 43
Torso 44
Sense organs 45 46
Reproductive organs 47
Excretory 48
Locomotory 49
Tail 50
Shape size (animals, parts)
Other or parts 51 52
Covering colour
Life history 53
Direct animal comments
No comment 67
Names
No Names 68
Popular name 65
Scientific name (in English) 66
Recognition 57
Phyla/class name 58
Family/order/genus name 59
Comparison with human 60
Comparison with inanimate e.g. toy 61
Reference to extinct animal 62
Comparison named animal 63
Misclassification 64
Other
Naming strategies
Direct identification 73
Other reference e.g. ring 74
Human animal interactions 70
Conservation

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APPENDIX 5

Are zoo visitors interested in conservation?

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formerly Head of Education, Zoological Society of London

Paper given at 7th IOSTE symposium: Science and Technology Education in a Demanding Society, Veldhoven, The Netherlands, 23-31st August 1994.

pages 869-880 in the proceedings

Summary

There is a dichotomy of purpose between the zoos and their visitors. On the one hand zoo management see their task as one of conservation whilst on the other hand the visitors are not overtly concerned about this issue and make their visit to the collections to 'see the animals'. This paper reports an ethnographic research project conducted in the UK and the USA which listened to and analysed the conversations of visitors, both school groups and leisure visitors. Whilst there is similarity in the topics that are discussed by children and their adults on both school and leisure visits, in both the UK and the USA, conservation is scarcely mentioned.

Introduction

Conservation and education are cited by western zoos (Brisbin,1993; Brambell 1993; IUDZG and IUCN/SSC 1993) as their main mission and they design their interpretation accordingly. 'Education' is the title of Chapter 4 in the World Zoo Conservation Strategy and the first section opens with the declaration 'in one way or another they (the visitors) have an interest in animals'.

This interest could be the starting point in developing public understanding about biological conservation because visitors arrive at a zoo with both knowledge and attitudes about animals and associated issues. Furthermore, zoos and aquaria 'provide a unique view of wildlife. While television, books, movies and videos provide factual information, they cannot match the emotional impact of seeing live animals'

(Hotchkiss 1993).

However, visitors already hold opinions about some of the animals with which the zoos are working

(Bitgood et al.

1993) and may be neither interested in nor support projects for animals for which they feel no affiliation.

Visitors divide their time between looking at animals and other activities (Rosenfeld 1980) and prefer to look at exhibits with active large animals that are both clearly visible, near to them and with a baby

(Bitgood and Benefield

1986). The preferences of visitors for the types of animal viewed are governed by affective reasons. Visitors prefer to look at species perceived both as dangerous and beautiful. Furthermore, visitors consider interaction with the animals important

(Rosenfeld

1980). However, looking at the animals only occupies about one third of visitors' time (Rosenfeld 1980). The rest of the time visitors move around, eat, and spend money.

Over 50 % of the visitors to USA zoos are children (Joslin et al. 1986), and the majority visit with their families and have been before (Hill

1971). The adults regard the zoo as a less highbrow visit than that to a museum or art gallery. Social aspects of the visit are important (Cheek

1971) and, moreover, zoo visitors rationalise their visit because it is 'for the children to learn about animals'

(Andersen

1993) and thus a more appropriate place for a family visit than is a museum (Rosenfeld 1980; Bitgood and Thompson 1987; Hensel 1982; Andersen 1993). These researchers show that visitors not only look at the animals, the total exhibit and the setting in which they are located: they also respond to what they see.

In contrast, school parties come to the zoo with defined educational objectives (Marshdoyle et al. 1981; Tunnicliffe 1994). An international survey

(Tunnicliffe

1994) conducted in 1992 amongst school teachers who arranged a field trip to a zoo revealed that of 147 respondents, 110 (75%) said that they considered conservation an important aspect of their visit but only 65 (44%) cited this as a focus topic. Eighty five (51%) of the respondents said conservation was not a theme they would study. The popularity of conservation as a reason for zoo study was highest amongst teachers of the 7-9 year olds (33 out of 69 or 48%). This age group were the most frequent visitors. While conservation was rated as important, it was significant that those teachers who affirmed the topic's importance in their pupil's education also said that they brought the children to the zoo to study it. There was no positive correlation between the teachers saying they were studying biology in the zoo and also studying conservation. It was significant that, contrary to what one might expect from general discissuons with teachers, he study of conservation was not the dominant reason for teachers bringing pupils to the zoo. The teachers who did not cite conservation as a study theme thought it important that primary students noticed adaptations to the habitat, the real size of the animals, as well as classification and the variety of life.

Table 1

EXHIBIT FOCUSED CATEGORIES

Category of Conversation Topic	Explanation
EXHIBIT ACCESS	Making sense of the exhibit and finding something to observe e.g. 'Look!', 'Where is it?'
EXHIBIT FOCUSED i. Other EXHIBITS ii. ANIMAL FOCUSED iii. Other TOPICS related to animals	i. The furniture and setting e.g. rocks, paintings ii. Observing the structures and behaviours of the animal and seeking to categorise it. (subdivisions, body parts, e.g. head, behaviours e.g. feeding, names iii. e.g. the habitat, conservation.
MANAGEMENT	Organising the group by behaviour and dialogue e.g. 'Look!', 'Come here', 'Let's move on'

SOCIAL	Responses to conversations e.g. 'Yes' names and titles of individuals, 'Michael', 'Mum', 'Miss', so that the other categories of conversation flow smoothly, also 'irrelevant' social conversation incidental to animal exhibits, e.g. 'family gossip'

However, despite the intentions and voiced opinions of the teachers, do the school groups discuss conservation during their visit? Zoos are places of conversations (Lucas, McManus and Thomas 1986) and it is the actual exhibits, not a planned agenda, that spontaneously trigger conversations (Hilke 1988). Visitors ask questions (Taylor 1986), give directions, recall, role play, use the conversations to organise their group (Hensel 1987), plan what they will do next, as well as talk to the animals. Thus conversations may fall into four major categories shown in Table 1: *Exhibit Access, Exhibit focused, Management* of the group and *Social* conversations (Tunnicliffe 1993).

The topics that visitors talk about when looking at animal exhibits have not been investigated to any extent, but visitors to aquaria name the animals, comment and explain behaviours particularly anthropomorphically, and pass a few comments about the animals' natural habitats as well as some affective comments related to the animal type (Taylor 1986; Hensel 1987).

Conversations are stimulated by the animals and may be used both to understand the exhibits and to exchange individual thoughts, memories and opinions with the rest of social group. Thus it would be expected, if the teachers who chose to take their school groups to the zoo are representative of the other adults who chose to take their own children to the zoo, that conservation would be a topic talked about. Conversations needed to be gathered and analysed to find out if this were so.

Method

This research project sought to establish, through ethnographic methodology, a description of what primary aged children and their accompanying adults talked about when looking at animal exhibits in zoos. Data was collected in both England (UK) and the USA. The project set out to describe and explain '*what is*' and led to the researcher accounting for what has occurred (Cohen and Manion 1989). I was concerned with providing descriptions of children in their contexts.

I accompanied children and their adults and tape recorded their conversations after receiving permission to do so from the teacher in charge of the party. Then tape recordings were transcribed. Units of conversations, defined as the 'group conversation in front of any one exhibit from the beginning of the conversation until it ceased', were identified in the transcripts. An example of a unit of conversation is shown below.
Five year old children held this conversation in the Cat House at Cincinnati Zoo and Botanical Gardens whilst looking at a caracal:

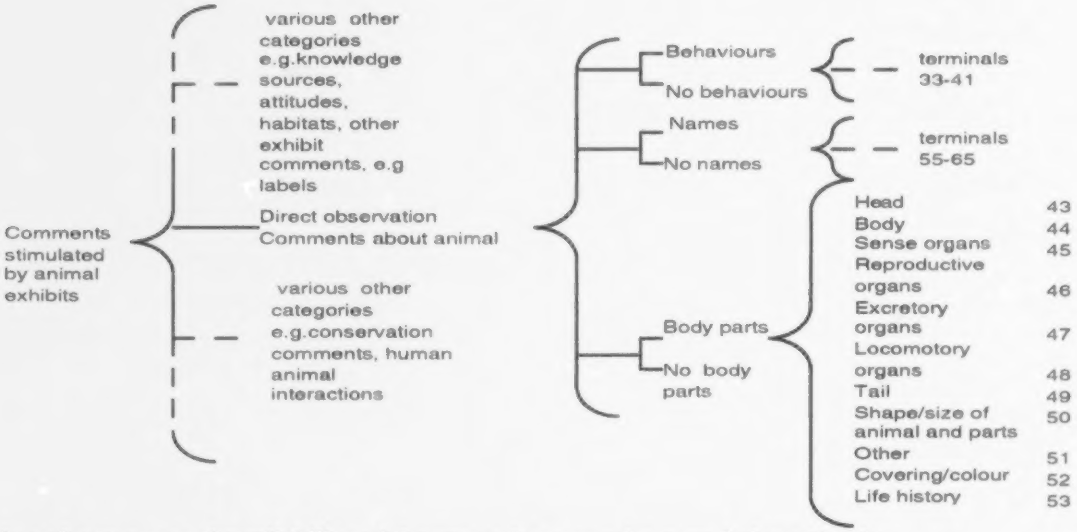
Adult: There's that picture again. [the endangered animal symbol used throughout the zoo] What does it mean?
Girl: There won't be much any more. It's endangered. There he is over there.
Girl: It's in the corner. There are two.
Adult: You can see his tail.
Girl: Oh Mum!

Each topic of conversation was then coded according to a systemic network (Bliss et al. 1983) which had been worked out from pilot studies (Tunnicliffe 1993). A systemic network is a means of grouping or categorising things, in this case conversations, to be a parsimonious representation of the data, whilst preserving the relationships between categories in such a way that comparisons can be made between groups. The network can be regarded as the sets of boxes into which the researcher puts each part of the conversation. At one extreme of the continuum of categorising the conversations are highly specific items, whilst at the other end is the main descriptor, in this case 'children's comments'. The numbers at the right of the figure label the most specific level of table categorisation. There were 74 categories in this network (Fig 1). A bar, '[', indicates that an attribute may be either/or but not a member of both categories, whilst a bracket, '{', indicates one of a number of categories which an animal may have. Each conversation unit was categorised with the appropriate number from the networks. Hence the above conversation was represented in the following way.

71 / 19/ 13
Adult: There's that picture again What does it mean?
68/ 20/ 68/ 40/ 20/
Girl: There won't be much any more. It's endangered. There he is over there.
20/ 23/ 50
Girl: It's in the corner. There are two.
3/ 49
Adult: You can see his tail....
31/ 3
Girl: Oh Mum!

The data was entered into a Minitab statistics package, with a 1 scored in each category of topic which was observed in a conversation unit.

Fig 1 Part of the Systemic network used in coding the conversations


Comments stimulated by animal exhibits
various other categories e.g.knowledge sources, attitudes, habitats, other exhibit comments, e.g labels
Direct observation
Comments about animal
various other categories e.g.conservation comments, human animal interactions
Behaviours
No behaviours
terminals 33-41
Names
No names
terminals 55-65
Body parts
No body parts
Head 43
Body 44
Sense organs 45
Reproductive organs 46
Excretory organs 47
Locomotory organs 48
Tail 49
Shape/size of animal and parts 50
Other 51
Covering/colour 52
Life history 53

In order to assess the reliability of the network a second person independently categorised 20 conversational units which provided 434 instances of a category. The re-marker disagreed with 5 instances of coding but also omitted 29 possibilities in the categories of structures, behaviour and exhibit comments. The proportion of categories consistently classified is represented by 'p'.

$$p = \frac{434 - 29 - 5}{434} = \frac{400}{434} = 92\%$$

This represents a high coefficient for categoric coding. A better index of classification consistency is provided by Cohen's kapp (Cohen, 1960) which corrects *p* for the proportion of elements that would be consistently classified by both raters purely by chance. However, since the categorisation presented here involves 74 categories, the

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difference between *p* and *k* is likely to be very small, so that be very small, so that in most cases, will be an appropriate index of classification consistency.

Results

An overall comparison of the main topics of conversations between the data collected in the USA the UK was made for both school and family visits (Tables 2 and 4). The proportion of conversations about either the natural habitat of the animal, conservation topics or the body parts, behaviours and names of the animal were also identified for both groups (Tables 3 and 5). Since the categories are not mutually exclusive it is not legitimate to use a 5 x 2 contingency table, therefore each column was treated independently in each table using the total value for each country for each category.

Children and accompanying adults mention other aspects of exhibits significantly more in the UK school groups. However, children and their adults talk about conservation significantly more during a school outing in the two USA zoos than in the UK (Table 5). Family groups (Table 2) commented in similar proportions about the main topics of the exhibits, except the London families commented to a significantly greater extent about 'exhibit access' and included more management/social comments in their dialogue than the USA groups.

Table 2: Main Topics of Family Conversations at Live Animal Exhibits: Main topics (percentages of total conversations)

Zoo	exhibit focused		other exhibit		animal focused		exhibit access		man/ social	
	no	%	no	%	no	%	no	%	no	%
Rio Grande n=65	65	100	23	35	63	52	34	75	49	75
St Louis n=120	119	99	40	33	119	99	68	82	91	76
Caldwell, Tyler n=74	74	100	16	22	72	97	49	66	59	80
Indianapolis n=116	116	100	58	50	116	100	79	68	71	82
Total USA	374	100	137	37	370	99	241	64	270	72
London n=143	142	99	62	43	141	99	123	86	122	85
$\chi_1 2$ (totals)	not significant		not significant		not significant		significant $p < 0.005$		significant $p < 0.005$	

Families comment in similar proportions about animal focused topics (Table 3) except that the London families used some type of name for the animals in their conversations to a significantly greater extent than the USA families.

Table 3:
Main topics of animal-focused including topics relating to Conservation and Biodiversity - Family Visits in the UK and USA

Zoo		Conservation		habitat		body parts		behaviours		names	
		no	%	no	%	no	%	no	%	no	%
Rio Grande	n=65	0	0	4	6	44	68	45	72	47	100
St Louis	n=120	1	1	4	3	55	46	71	59	89	71
Caldwell	n=74	1	1	2	3	28	38	43	58	67	91
Indianapolis	n=116	0	0	0	0	68	58	69	60	83	72

Total USA	n=375	2	0	10	3	195	52	228	61	286	76
London	n=143	0	0	6	9	75	53	95	66	126	88
$\chi_1 2$ (totals)		not significant		not significant		not significant		not significant		significant $p < 0.005$	

School groups (Table 4) comment in a similar way about the major aspects of exhibits but it is significant ($p < 0.005$) that the USA children commented less on other aspects of the exhibit, focusing their comments on the animals.

Table 4:
Main topics of School conversations in the UK and USA

Zoo		exhibit focused		other exhibits		animal focused		exhibit access		man/ social	
		no	%	no	%	no	%	no	%	no	%
London	n=459	459	100	227	50	455	98	289	63	354	77
Whipsnade	n=197	197	100	107	54	194	99	137	70	150	76
Total (UK)	n= 656	656	100	384	59	652	99	426	65	504	77
Cincinnati	n=239	236	99	97	41	235	98	144	60	175	73
Indianapolis	n=62	62	100	30	32	62	100	40	65	48	78
Total USA	n= 301	298	99	127	42	297	99	184	61	223	74
$\chi_1 2$ (totals)		significant $p < 0.005$		significant p < 0.005		not significant		not significant		not significant	

Table 5:
School conversations about animal related topic including conservation and natural habitat of animals.

Zoo		conservation		habitat		body parts		behaviour		names	
		no	%	no	%	no	%	no	%	no	%
London	n=459	5	1	14	3	280	61	301	66	401	87
Whipsnade	n=197	3	1	12	6	117	59	122	62	165	84
Total	(n= 656)	8	1	26	4	397	61	423	65	566	86
Cincinnati	n=239	14	6	13	5	118	49	135	57	209	57
Indianapolis	n=62	1	2	0	0	33	53	51	83	44	71
Total USA schools	n=301	15	5	13	4	151	50	186	62	253	84
$\chi 2$ (totals)		significant $p < 0.005$		not significant		significant $p < 0.005$		not significant		not significant	

Furthermore, the English school groups comment on body structures significantly more than the USA school group who mention conservation significantly more ($p < 0.005$) (Table 5). However, the higher count for conservation topics in the USA is due to the comments made at Cincinnati zoo. Had data about families been collected in this zoo it may have shown that families commented about conservation to a greater extent than in other zoos. This difference in the number of conservation topics reflects is a local phenonmenon and not a national trend.All other topics are talked about in similar proportions. Overall school groups talked about conservation significantly more (p <0.005) than did the family groups.

Discussion

The results provide an account of what interests zoo visitors, gauged through their spontaneous conversations, when looking at animal exhibits. Both school and family groups notice the body parts and behaviours and use names, but do not talk about conservation issues to any great extent. Although it is significant that more school groups did mention this topic in some zoos, the proportion of 'school' conversations mentioning either conservation (endangered animals and extinction), or natural habitats was low, despite a significant number of teachers having indicated in another survey that learning about conservation was one of the reasons for taking their pupils to the zoo (Tunnicliffe 1994). The increased mention of conservation amongst the school visitors suggests that the teachers had heightened the awareness of the children to this topic or that the zoos involved had presented the conservation message more successfully for schools groups than the other establishments.

The higher number of 'exhibit access' conversations made by the London families suggests that either the London families were less familiar with the zoo and the exhibits and therefore not likely to be repeat visitors, or alternatively, the exhibits may have been better designed in the USA so that the need for this type of conversation could have been less. The London families appear to be more determined in their viewing, expressing more exhibit acess and naming comments together with more management/social comments. This suggests a concentrated approach to see and identify animals which may be associated with infrequent zoo visitors and hence an unfamiliarity with the exhibits and the animals.

The visitors concentrate on observing the animal that they look at, but the zoos have a mission about conservation. How can this dichotomy of purpose be resolved, on the one hand visitors wanting to look at animals but zoos wanting to educate the public about conservation science? Zoos need to be aware of the content of the conversations of their visitors as well as their interests. Management needs to acquire an appreciation of the level of scientific understanding which their visitors possess which, appears to be of a perceptual observational level and of an everyday and 'pre-science' nature.
Zoos need to build on the spontaneous observations of the public and lead them, by way of their first hand observations of attributes, into the fundamental concepts of the science behind biodiversity. The key concepts of the two aspects of conservation, conserving the animals in their natural habitats and the developments of conservation biology techniques, should be introduced to the visitor.

There are two possible strategies. The issues of conservation biology would be most aptly developed in separate interactive displays away from the living animals. Such exhibits would start with what the visitor has seen in the zoo, and with the animal with whose needs the visitor is most familiar, themselves. Exhibits should be simple, for research has shown that complex multi-species exhibits do not enhance learning (Peart 1984) but pertinent to the animals which the visitor has seen. If the science is unrelated to the immediate vicinity, visitors are rarely interested (Friedman 1993 personal communication). Furthermore, both groups in this study included children of primary school age whose knowledge of animals and their needs is at an elementary level. The lack of knowledge may preclude children from taking an interest in the conservation message unless it is presented in an active participatory manner

(Jackson-Gould 1993).

An alternative strategy is to keep apart the two ends of the spectrum. The animal collections which the public visit could focus on the interests of the visitors who want to be able to look at animals, whilst the scientists and keepers could work behind the scenes at conservation issues. However, such tactics could render zoos vulnerable to those factions in society that are against the exhibiting of animals but do support the breeding in captivity of endangered species.

The aims of the zoos and the majority of visitors do not seem to coincide. Visitors come to see animals and do not spontaneously discuss conservation issues. Zoo employees are committed to conservation and seek to orient all their activities towards it, but, despite their efforts they are not having an educational or political impact. Their message is not reaching visitors.

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APPENDIX 6

A NEW CATEGORISATION OF LABELS IN ZOOS

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The label is both the most frequent method by which the institutions communicated with their visitors and the information source to which the visitor turns (McManus 1987; McManus 1989b; McManus 1990; Desjardins, Jacobi et al. 1991; McManus 1991) and labels have evolved from the *declarative* approach (Miles 1988b) to the *invitational*, but the former is in use in many zoos. Visitors are provided with two categories of information; that about exhibits and that which 'manages' the visitors or management information. Exhibit information tell the visitors about the animal but this information may not be what they want to know (Tunnicliffe 1993 e). Management information provides directions which help satisfy the other needs of visitors, such as a hunger, and directions to various locations or forbidding access. Effectively, management labels influence the visitors' movements and behaviours through providing directions.

Labels can be grouped according to the type of information they purvey. There are orientation labels or signpost labels. There are people focused labels and there are animal focused labels. Information given about orientation is at three levels. The first or macro level are labels in the form of signposts or hand held maps. These seek to answer the visitor's questions of the type, 'Where are we?', 'Where is the target we are looking for?. There is a direct overview of the site information labels e.g. a map or signpost with the major areas named and their direction indicted. The next level of orientation needed by the visitor is the Identification of larger buildings or areas such as 'the Reptile House' 'Gift shop'. Finally, once the visitor has reached their target area they are told what the animals are and some background information by specific labels for particular animals on there enclosures. These labels may be grouped as stemming from an animal focus or from a people focus. Thus, labels are animals or people focused and the people are VISITORS or MANAGEMENT and people-labels are about NEEDS or ACTIVITIES.

The people focus can be directed toward the visitors or toward the management in respect of the locations in the zoo. Visitor focused labels(Table 1) are divisible into visitor activities and visitor needs. Needs consist of regular and emergency servicing needs. Regular needs are either input and output. Input needs are the shop, the cafe, the carpark for example whilst output needs are the lavatories, the litter bins and the recycling bank. Emergency needs are services such as First aid, lost children.

Activities labels suggest what it is the visitor can expect to do themselves at the exhibit. The Discovery Centre, labels used at both London Zoo and at Whipsnade suggest hands on activities. They are Action labels. Labels can indicate what activities the visitor can actually be involved in. These activities may include tasks as badge making, testing their reaction times or questioning the Whipsnade interactive video or what type of active viewing experience the visitor can anticipate, 'Walk through Aviary, Underwater viewing at the Sealions at Whipsnade. Passive actions or Entertainment can be indicated by people labels. 'Meet the Animals' sign sound an invitation, 'Animal Encounters at 2.30' sound like another type of invitation. Management labels on the other hand reflect the logistics of running the establishment, 'Deliveries', 'carpark', 'staff entrance.' Labels refer to the function of the buildings from a management point of view. Breeding Centre, Kiosk, Kitchen, Mess room, the Paddocks, the Aviary, the boiler house are examples which can be seen at London Zoo.

Management labels (Table 2) serve a Public Relations function. They are used to acknowledge sponsorship so at London Zoo there is the Clore Pavilion, The Sorbells, the Mappin Terraces for instance, all labelled and signposted, meaningless to visitors but the initiated know these are the names of generous benefactors. Retail labels identify where money is taken and places which can be a source of negative cash flow if the revenue does not cover expenditure incurred in running that outlet e.g. drinks carts, shop. There is a dichotomy of labelling in these examples because they are also service needs of the visitor and can be regarded as Visitor oriented labels too.

TABLE 1: VISITOR FOCUSED LABELS

1 ORIENTATION		2 ACTIVITIES		3 NEEDS	
1 Find myself labelse.g 'Where am I?' 2 Target locations e.g. 'Where is what I want to see?'	ACTION ACTIVITIES e.g. a) hands on e.g. Badge making b) passive action e.g. Walk-through aviary (St Louis)	PASSIVE ENTERTAINMENT e.g. 'Meet the Animals', Animal encounters, Birds of prey flying display	Regular Input Needs e.g. drinks, ice cream, cafe	Regular output Needs. e.g. shop, lavatory, litter bins, recycling points. Join the Friends of the Zoo points	Emergency Needs e.g. first aid, lost children, lost property

TABLE 2: PEOPLE FOCUSED LABELS: MANAGEMENT

1. LOGISTICS	2. CAGE TYPE	3. 'PR' LABELS	4 .RETAIL OUTLETS	5 .FUNCTION

e.g. carpark, Deliveries	Aviary, paddocks	Sponsor acknowledge-men e.g.. Clore Pavilion, London Zoo. Individual animal sponsor plaques.	cafe, shop, balloons, face painting	Hatchery, breeding centre, animal hospital

Animal focused labels provide information about the zoological taxonomy of the animal which reflects natural kinds, or the popular name used in everyday parlance which may or not be the basic level of terminology (Markman, E. 1989). Labels which reflect historical or evolutionary associations of the specimens and the people who discovered the species or that specimen, although the later association of individual specimens with people is more often found in a museum, e.g. Chi Chi , presented to UK Prime Minister Edward Heath by the Chinese people, or the Emperor Penguin in the Captain Cook Gallery at the National Maritime Museum associated with Captain Cook or the Arctic Foxes in the British Arctic Explorers gallery. Although, there is a plaques on the old Beaver pool wall at London Zoo commemorating the gift of the beavers, no longer in residence, from the Canadian people to the Queen. Information about other aspects of science may be given through the labels, especially about conservation biology issues.

The geographical origin of the animals or their natural habitat is the focus of many labels(Table 3) whilst others are based on animal behaviour such as time of the 24 hour period when they are active, Nocturnal house, or the way in which they obtain their food, e.g. Hunters, plant eaters. Alternatively, labels focus on the animal's social habits , e.g. Bee Hive, Wolf pack.

Specific zoo behaviours are an important aspects of information giving in Zoological Gardens. Visitors want to know the whereabouts of an animal if it is not to be seen in its house, so we have 'Location' labels. An example is 'The elephants are usually outside', a notice frequently observed at London Zoo. Psychological referent labels may be featured with a number of animals, 'Ming Ming is more timid of the public than Bao Bao so may not be on display. She can choose to be in rooms at the back' was to be seen at the Giant Panda exhibit enclosure at London Zoo. Additionally, 'Life history' information is given through labels, e.g., 'These two ocelot cubs were born 16.10.92' was seen in the Lion Terraces at London Zoo.

... Finally, many labels refer to the Ecology of the animals, they explain whether it is a single or mixed species exhibit or discuss the megahabitat on display such as Sea Water, Fresh Water Hall or to an Ecological niche such as 'Mangrove Swamp' in the Sea Water Hall of the Aquarium at London, 'Woodland Bird Walk' at Whipsnade.

Animal focused labelling is summarised with 4 categories: 1. SCIENTIFIC 2. BEHAVIOURAL. 3. GEOGRAPHIC. 4. ECOLOGICAL and each category is subdivided. (Table 3).

TABLE 3 : THE FOUR CATEGORIES OF ANIMAL FOCUSED LABELS

SCIENTIFIC	TAXONOMIC		OTHER TOPICS		
1. Zoological taxonomy	2. Popular terms e.g. Pets Corner	3. Basic term e.g.. Lizards, snakes, Insects. Lions. Monkeys	Other Science e.g. Conservation biology e.g. Partula Snail exhibit at Jersey	Historical a) Animals of Antiquity. b) Living Fossils e.g. Tuartura, c) Animals and their finders or recipients	Citizenship e.g. Man's effect on planet, Human population growth. Effect of refuse on animals
BEHAVIOURAL LABELS	NATURAL BEHAVIOUR			SPECIFIC ZOO BEHAVIOUR	

1 Usual Activity Time e.g. Nocturnal House(Bristol Zoo)	2 Food behaviour. e.g. Birds of Prey, (Rio Grande)	3. Social Animals. e.g. (Ant colony Insect House Cincinnati)	1 Location in enclosure	2 Psychology e.g. 'Ming Ming is timid' London Zoo	3 Life history, e.g. These cubs were born on. ...(London Zoo)

GEOGRAPHIC		
CLIMATIC	BIOMES	REGIONAL
Tropical House, (London Zoo, now demolished) Animals of the cold	Rainforest, (Discovery Centre Whipsnade). Animals of the Tundra, the veldt (Cincinnati)	Animals of Asia. African Pavilion (Metro Toronto Zoo)
ECOLOGY		
Mixed Species e.g. Coral Reef	Mega habitats e.g.. Sea Water, Freshwater	Specific Niches, e.g. mangrove Swamp, Woodland Bird Walk.
OTHER	Historical Associations e.g. statue of Martha, last passenger pigeon	Fictional Associations e.g. Winnie the Pooh statue at London

The Zoological taxonomy used in labels has no consistency. Management may use the Phylum as its label category on one display yet use a Family terminology in another. The Animal houses reflect this multi- hierarchical approach. London Zoo have an Invertebrate House (sub kingdom term). This terms is a useful 'collection' term equivalent to Non Chordates, the Chordates being then divisible into the sub phylums Vertebrate, the vertebrates), the Urochordates and the Cephalochordates. Many zoos have a Bird House (a Class term).and many zoos have a Cat House (Family Term). The Penguin Pool is using the genus taxonomic level as the labelling term. The species, the basic taxonomic unit used by zoologists, is often used on direction signs e.g. the Red Panda, the Colubus Monkey.

Thus, the labels tell the visitor what the zoo wants them to know about facilities or about their exhibits. At individual exhibit level the label can involve the visitor with the exhibit either through questions that the visitor can seek to answer through observations or actions or through directing their observations to particular phenomenon in the exhibit. Where there are Action exhibits the label tells the visitor what to do. Labels are, as McManus(1987) points out, the voice of the establishment.

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